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OF THE

SENATE AND ASSEMBLY

OF THE

THIRTY-NINTH SESSION

OF THE

LEGISLATURE OF THE STATE OF CALIFORNIA

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VOLUME II



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REPORT

OF THE

CALIFORNIA STATE AGRICULTURAL SOCIETY

FOR THE YEAR 1909



SACRAMENTO:
W. W. SHANNON, : : : : SUPERINTENDENT STATE PRINTING
1910

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REPORT

OF THE

STATE AGRICULTURAL SOCIETY.

To His Excellency, J. N. GILLETT,
Governor of the State of California.

SIR: We herewith submit, for your consideration, the Fifty-sixth Annual Report of the State Agricultural Society.

Besides a statement showing the receipts and expenditures of the Society for the past year, it contains some articles, original and selected, bearing on the industrial interests of this State and the statistical reports rendered by different counties.

STATISTICAL REPORTS.

In regard to these statistical reports, we desire to say that the returns are not what they ought to be. The law, Statutes of 1905, makes it "the duty of boards of supervisors of each county, on or before the first day of November of each year, to supply the Secretary of the State Agricultural Society, upon blanks to be furnished by him for the purpose, statistics showing the products grown, produced or manufactured in said county, for the year preceding, and the expense thereof shall be a county charge, to be paid as other county charges against the county."

This is a plain legal direction of duty to a body of men who presumably have taken an oath to support the laws and the constitution, and yet some of the boards of supervisors will not take steps necessary to secure this report. This Society has done its duty in the premises promptly and as thoroughly as it knows how. Our Secretary has each year, early in the summer, sent to all county supervisors the required blanks with copy of the law and a note calling attention to the same, and has followed this with letters reminding them of their duty, until assured that the report would be forthcoming, or until it became too late to utilize a report.

This year fewer counties have reported than usual, and it is evident that the law ought to be abolished or something done to make it effective. It is noticeable that those counties which have obeyed the law and sent in regular annual reports almost without exception show a gradual improvement in the fullness and correctness of the returns, leaving us to believe that if all would get into the habit of reporting we would in a little while secure material for a compilation that would meet the popular demand for statistics regarding this State and be of inestimable value. But we have no hope that under the present law this will be done.

It must not be inferred that the reports which we do receive are of

no value. As the best obtainable they are much sought after, since they are in most cases full and comparatively correct as to the counties reporting, and in very many cases the inquirer only wants to know what this county is doing, or what that county is doing, or what one county is doing as compared to some other. As a basis for obtaining State aggregates, however, they are deficient in proportion to the number of delinquent counties. The final compilation as we are able to present it, is not creditable to this Society, nor to the State of California.

To repeal the law and abandon the attempt to collect industrial statistics would be to go backwards, to put California behind the less progressive States. Since this can not be thought of, the thing to do is to so amend the law as to make it effective. Several measures might be suggested to this end, but we believe the simplest and easiest thing to do would be to make county assessors ex officio county statisticians, require of them a house to house canvass in making assessments and collecting statistical data, increase their compensation according to the increased work, and provide a penalty, first, for the producer or manufacturer who declines to give the desired information, and second, for the official or officials who neglect in any way to carry out the provisions of the law. We suggest imposing this extra duty on the assessors because they are supposed to be better informed regarding values and industrial conditions in their respective counties than other citizens, and because, further, they are already required to collect certain data, and they might as well make one job of it and do the work complete. This is substantially the Kansas law on the subject, and there it works very satisfactorily.

Another effective remedy would be to add to the present law a provision that where county supervisors neglect or refuse to appoint a statistician on or before a certain date, say August 1st of each year, it shall become the duty of the State Agricultural Society to appoint a citizen of the defaulting county to collect the statistics of said county at the expense of the county, and in the event the supervisors refuse to allow such claim, then authorize the State Treasurer to pay the same and deduct the amount thereof from any money due or that may become due from the State to said county from any source.

We know you will agree with us when we say that if this statistical work is to be continued it ought to be so complete as to be of maximum value and a credit to the State, and we ask your valued assistance in helping to bring about such amendment to the present law on the subject as will insure such results.

IMPROVEMENTS.

As you are aware, strenuous efforts have been exerted by the Directors during the last few years to rehabilitate the State Agricultural Society and make of it that far-reaching instrumentality for the betterment of the industrial interests of the State that it ought to be, and it will be gratifying to you to know that greater progress has been made in this direction during the past year, we believe, than during any other single year in the history of the State. This has been possible by reason of appropriations for needed improvements which we are not unmindful were secured largely through your good offices. The old pavilion in

Capitol Park, which had served its purpose, has been torn down and the material either used in new structures or disposed of, as was most advantageous; three splendid new exhibition buildings and a pumping plant, with water tower and concrete water tank have been erected at Agricultural Park; the infield at the race course has been leveled and piped ready for irrigation preparatory to sowing it to some suitable plant that will keep green all the year; a number of drives and walks on the fair grounds have been graded and graveled, and the poultry house, barns and cattle sheds, long suffering for the want thereof, have been well painted. These in the aggregate make a creditable showing, giving Agricultural Park something of the appearance of a real fair ground.

There was appropriated by the legislature of 1907, the sum of $50,000 for wrecking the old pavilion at Capitol Park and constructing two new buildings, one to be known as the Agricultural Building and one as the Manufacturers' Building, at the Agricultural Park. This appropriation, and other appropriations for needed improvements made by the last legislature, were expended under the direction and supervision of the State Engineering Department. That department found the requirements of the two buildings named were considerably more than could be secured with the $50,000 appropriation, and consequently the legislature of 1909 appropriated $20,000 more for the purpose. The wrecking of the old pavilion cost $5,993.00, and $2,128.80 was returned to the fund for materials sold, thus making available for the new buildings, $66,135.80. The State Engineer's estimates for these buildings were as follows:

Agricultural building	$43,375 00
Manufacturers' building	24,458 00
Total	$67,833 00

Bids were received for these structures as follows:

Agricultural building	$50,900 00
Manufacturers' building	29,057 00
Total	$79,957 00

These bids did not include $3,500 for electric wiring and a fireproof vault.

On the advice of the State Engineer all bids were rejected, and the work was performed under his direction by day's labor. When the Manufacturers' Building shall be plastered the cost will stand:

Agricultural building	$43,373 00
Manufacturers' building	24,674 00
Total	$68,047 00

There was also appropriated during the 1909 session of the legislature $30,000 for a machinery hall, $10,000 for a water plant, and $10,000 for painting buildings and improvement of the grounds.

The estimate for machinery hall was $26,290.00—now completed.

The water plant is practically completed, at least sufficient for use, at a cost as follows:

Well boring, casing, pump and motor	$1,239 41
Concrete tower and tank	5,320 78
Water piping for grounds	3,431 55
Total	$9,991 74

Of the $10,000 appropriation for general improvements to the grounds, there has been expended the sum of $9,824.16, the main items being leveling infield, moving trees, filling grounds, graveling drives and walks, painting barns, excavating for pipe, electrical installation, etc. A full itemized list of all the expenditures may be found in the State Engineer's office. The balances in the several appropriations at this time, which amounts are practically covered by contracted liabilities, are as follows:

Agricultural and manufacturers' pavilion	$3,378 23
Leveling grounds, available balance	175 84
Pumping plant, available balance	8 26
Machinery hall, available balance	2,397 97

STARTED RIGHT.

We believe that by combining the accommodations for a State Fair in one enclosure,—by presenting the entire exhibits and all the attractions to the visitors for one admission, as is done at all other State fairs in the country, the Society has got started right, and is now on the road to that success which all Californians have hoped for. Visitors never went away so well pleased as last year, and exhibitors praised the arrangement; the first were enabled to see all the exhibits for one admission, and the latter had an opportunity to display their exhibits to all who attended the fair. This appreciation was manifested by the returns, which, in spite of the unfinished condition incident to the unavoidable delay in construction, were better than had been realized for many years, leaving the hope that with adequate equipment and better local transportation facilities, the former of which the State can afford and the latter of which is promised by private enterprise at a very early date, the State Fair of California will soon become self-supporting.

Our State is growing in population and developing on all material lines, and it is fitting that the State Agricultural Society should be in advance of progress and be a potent factor in helping along the material industries. With continued good management and liberal encouragement from the State and the people it may soon become, as its present directors are striving to make it, one of the strongest instrumentalities for State development.

MORE BUILDINGS NECESSARY.

But we must have better equipment. Notwithstanding the last legislature was generous in its appropriation for new buildings and other needed improvements, the Society is still lacking in accommodations for its patrons. Three splendid new exhibition buildings were erected last year, as heretofore stated, with an aggregate floor space of about 50,000 square feet, and yet five tents, varying in size from 40 by 60 to 90 by 120 feet, had to be erected to accommodate the overflow.

None of the buildings at present are arranged to suitably accommodate fine arts or the handiwork of women, and these refining and attractive branches ought to have a prominent place at every State Fair.

The present temporary shed used for a judging ring ought to be replaced by a fine amphitheater, where stock could be paraded and a horse show held each afternoon or evening as at all good fairs in other

states; and as soon as possible the present unsightly old grand stand ought to give away for one built of steel and concrete. A vehicle and agricultural implement building is needed to help relieve the pressure in the other buildings for exhibition space. These, with suitable café in which to feed the visitors and an allowance for maintenance of the grounds, constitute the present most urgent needs of the Society, and it is hoped the next legislature will see the necessity for them and provide the means for their early procurement.

A PROSPEROUS YEAR.

The past year has been one of prosperity for agriculturists throughout the entire country, crops having been good and prices of nearly all produce rating high. The United States Secretary of Agriculture gives the value of all farm products for 1909 as $8,760,000,000, a gain over the preceding year of $869,000,000. As showing the rapid growth of the agricultural wealth of the country it may be stated that the gain alone of the value of the farmers' crops for 1909 over the value of farmers' crops for 1908 equals one fifth of the total value of all crops only ten years ago.

California has shared in this general prosperity. Owing to a rather dry spring the cereal crops did not turn out quite as heavy as had been expected, but the high price that has ruled for hay and all kinds of grain much more than made up the deficiency, and as a result the hay and grain farmers in this State find themselves, as a rule, in better condition financially than a year ago, and stimulated by the hope of continued high prices are planting for the next season more extensively than for some years.

The most marked increase in output in California has been realized by the fruit growers. The total shipments of fresh deciduous fruit alone out of California this past season aggregated 15,265 cars, which is more than 2,000 cars in excess of the total shipments of the previous year, and far in the lead of any previous record. Prices, while ruling rather low on certain fruits at certain times, averaged fairly well for the season, returning to the growers in the aggregate sufficient to give renewed encouragement to their industry.

The cured fruit output is estimated by the *California Fruit Grower* at 185,000 tons, consisting of about 70,000 tons of raisins, 72,500 tons of prunes, and 42,500 tons of other fruits, such as peaches, apricots, apples, figs, etc. This aggregate is at least 20,000 tons in excess of any previous season's output. The pack of canned fruit and vegetables, full figures for which are not at hand, presumably kept up the average increase, but even if as great as the enormous pack of 1908, which was 6,236,548 cases, it would represent big returns to the orchardists of California. The hop crop of the State was a little below the average for the past few years, but the better prices insure a fair profit to the growers. The almond crop is estimated at about 1,500 tons and the walnut crop at about 8,000 tons. Prices ruled fairly high, insuring satisfactory returns to the growers.

This report contains statistical returns from forty-two counties of the State out of a total of fifty-eight. Those omitted are, with few exceptions, outlying and less productive counties. We estimate that the

forty-two that have sent in returns contain safely four fifths of the agricultural wealth of California.

On this basis the returns show that four fifths of the wheat yield of California last year was 258,238 tons, or 8,541,233 bushels; of barley 764,955 tons, or 30,798,200 bushels; and of oats 124,351 tons. The total grain yield, wheat, barley and oats, from the forty-two counties aggregated 1,145,544 tons, and was worth $31,723,469. The total amount of hay produced by the same counties was 3,085,852 tons, and was worth $32,119,856. This gives an average of a fraction more than $1.38 per cental for the grain crop of the State, and a little more than $10 a ton for the hay crop, prices which, including all varieties and all localities, are very satisfactory. The forty-two counties report a total of 38,181,642 bearing and nonbearing fruit trees—31,895,581 bearing and 6,286,061 nonbearing—and receipts from fresh fruits and vegetables of $29,739,339. To this must be added the returns from dried and canned fruit, previously referred to. The same counties return 4,458,445 head of live stock, including horses, mules, jacks, cattle, sheep, goats and swine, worth $66,538,521. They return 421,109 dozen chickens worth $2,179,837, and 26,724 dozen turkeys worth $625,528, and 13,797 dozen ducks worth $135,891, and 4,094 dozen geese worth $52,214. This gives the value of the poultry, exclusive of pigeons, as $2,993,470, which added to the egg output of 27,681,007 dozen, worth $7,886,012, makes a total to the credit of the poultry business of the forty-two counties of $10,879,482.

We have compiled these figures from the returns sent to us, conscious that under the system by which the data was collected they are not strictly accurate, and that they represent, as we have said, only about four fifths of the State, but as the best obtainable they form at least a basis for a fairly intelligent estimate, and as such are of much interest, and to the student of our resources as well as to the prospective investor will prove of material value.

With a suitable penalty added to the law, that will prompt all the counties to report, and a system of obtaining data that shall comprehend a canvass of the respective counties as careful as that made by the assessor, we might have a report that would be a source of pride to the State, and, as a reliable basis on which to figure developments and investments, would be worth to California many times its cost.

Very respectfully,

H. A. JASTRO,
President.

Attest:

J. A. FILCHER,
Secretary.

FINANCIAL STATEMENT.

February 1, 1909, to January 31, 1910.

SUMMARY.

RECEIPTS.

1909.			
Feb. 1—Cash balance	$121 49		
Park and pavilion receipts	16,993 00		
Rent	495 45		
Futurities	4,141 00		
Building and improvement	5,673 05		
Oakland appropriation	4,933 90		
Appropriation for aid	20,000 00		
		$52,357 89	

DISBURSEMENTS.

Expense	$9,303 71	
Races	4,052 00	
Salaries	6,025 00	
Payrolls	3,498 35	
Advertising	1,331 58	
F. W. Kiesel	5,726 00	
Premiums	14,183 20	
Bills payable	5,000 00	
Entrance due	2,018 30	
Interest	115 85	
1910.		
Jan. 31—Cash balance	1,103 90	
		$52,357 89

UNIVERSITY FARM AND SCHOOL OF AGRICULTURE.

By LEROY ANDERSON.

The University Farm is an area of 780 acres of land, situated at Davis in Yolo County, which was purchased for the University of California by special act of the legislature of 1905. It lays on the north bank of Putah Creek. It is of alluvial formation and capable of a very high degree of productivity. When purchased in 1906 all but a few acres was one big grainfield, and the work of development into a wholly useful college farm has been and continues to be a big problem, containing large expenditures of money and a long period of time.

Information concerning the dedication of the farm for instructional and experimental purposes in October, 1907, was given in the report of this Society for that year. Actual experimental work began upon the farm in that year also, but owing to the necessity of considerable equipment in addition to necessary buildings, instruction could not be offered until the following year. During October and November of 1908 five separate short courses for farmers were given, varying in length from eight days to eight weeks. These courses comprised poultry husbandry, dairy manufacture, irrigation and general agriculture, animal industry and veterinary science, and horticulture and viticulture. There was a total attendance upon these courses of 120 men and women from various sections of the State. The following January the school of agriculture was opened and offered a three years' course, about seven months each, of instruction in agriculture, to boys who have finished the common schools of the State. At the same time the opportunity was offered to students enrolled in the regular course of the College of Agriculture, Berkeley, to come to the farm for some practical work.

I will be pardoned if I note somewhat more in detail what is being done at the University Farm, for it is the center of a varied activity for the benefit of agriculture throughout the State.

SCHOOL OF AGRICULTURE.

It is less than a year since we opened our doors to receive regular students in agriculture, and now there are about forty young men studying in the three years' course. They are admitted when they are at least fifteen years of age in addition to having finished the eighth grade of the public schools. One half have had some high school training—from less than a year to graduation from high school. Their ages range from fifteen to twenty-four, and the average is eighteen. They are a sturdy lot of fellows with a purpose in view and a keen knowledge to know agriculture in all its phases.

In general, they are studying the principles and sciences which underlie agriculture with enough of the practice to fix the principles firmly in the mind. In particular, the chief subjects are: soil fertility and farm crops, botany, plant propagation, entomology, chemistry, animal and dairy industry, poultry husbandry, horticulture and viti-

culture, irrigation, farm practice and farm mechanics, farm accounts. English, mathematics, civics and United States history. The subjects sound like those of college. They are named the same, but are taught in a more elementary manner, easily within reach and calculated to arouse the interest of the boy in rural activities. The total cost per student, including board, lodging, fees and books, is about $225 for the year of eight months.

FARMERS' SHORT COURSES.

On October 4th the second series of farmers' short courses opened at the farm and similar courses may be expected each fall. The first, dairy manufacture, is a course specially designed for those who wish to become better trained in operation of creameries and cheese factories, or to acquire a better understanding of the principles involved in handling milk and milk products. This course continues for eight weeks. On the 11th three more short courses began, each two weeks in length. One in irrigation, field crops and soil fertility, which gives practice in handling instruments for leveling, laying out ditches and land for irrigation and measuring water, teaches the principles and methods of growing grain and sugar beets and fertilizing the soil. Another is for the dairy farmer who sells milk or cream. He is taught the most improved methods of handling his milk and separating and handling cream. The farm has one of the best dairy barns and best equipped creameries in the United States and two weeks working with this equipment means much to the dairyman. The third is in poultry husbandry, and is of interest to the man or woman who specializes in poultry or those who make it a side issue in general farming. This course includes feeding, breeding, care and management, construction of incubators, brooders and houses, scoring and judging and marketing fowls.

Beginning with November 5th were two more short courses, horticulture for two weeks and animal industry for three weeks. The first includes viticulture and entomology and instruction is given by lecture and field and laboratory work. Animal industry covers briefly a study of the different breeds of live stock, with each afternoon of practice in scoring and judging animals and study of anatomy and treatment of the more common diseases. All of the courses are the epitome of condensation in order that the busy farmer may learn a large amount in as short a time as possible. The days are full from eight in the morning until five in the afternoon with evenings occupied in the library and more lectures. The courses are free with the exception of a small fee on the basis of one dollar per week.

FARMERS' WEEK.

The desire to have something for everybody has led us to establish an even shorter course than any yet mentioned. We called it Farmers' Week. The name is not original with us, for it has been used two or lege faculty and each day a demonstration in judging some breed of live October, beginning Monday the twenty-fifth. There were from two to five lectures on each leading agricultural topic by members of the college faculty and each day a demonstration in judging some breed of live

stock. Afternoons and evenings were given to addresses and discussions on topics of live rural interest. Farmers' Week does not take the place of any of the short courses, and will probably be offered each year. On the other hand, we are trusting it may prove a means of getting together a large number of farmers who can not leave home for long and who can help their fellow men by rubbing elbows in a class room and laboratory for a few days. Farmers from different parts of the State need to know each other better. This is a grand opportunity amid educational surroundings.

PRACTICAL WORK FOR COLLEGE MEN.

I have described how the college through its farm is touching the boy who is the farmer of the future and the farmer who is now in the harness. We also use the farm to give the four-year college men a taste of the soil and of real farm life and atmosphere. At present, the men and women in the four-year agricultural course spend a half-year on the farm pursuing chiefly studies in animal and dairy industry, horticulture, and plant production. When the new buildings now under way are completed and needed equipment added, we expect these college men to spend at least a full year on the farm and so round out their technical and scientific training.

Our motto is "Something for Everybody." We can not realize it just now, for we have not sufficient equipment either material or human, but we are working toward it fast. The success of our republic is dependant upon an educated rural population. "Agriculture must be made to yield returns in wealth, in opportunity, in contentment, in social position, sufficient to attract and to hold to it a class of intelligent, educated American citizens. This is an end vital to the preservation of American democratic ideals." This is the aim of the University Farm and School of Agriculture, and in such a far-reaching enterprise we look for the coöperation and asssistance of all persons and organizations looking toward the general welfare of all the people.

"SICK SOILS."

(Contributed for this Report.)

The Eastern agricultural papers are coming down heavily on the importance of better methods of farming, and the agitation is bearing fruit in increased output and higher prices. In many of the older states the land has become exhausted and it is either a question of restoring the lost virtues or abandoning the farm.

California is a newer State, and the trouble has not reached that acute stage here that is manifest in some of the older communities, but the land disease (for such we may call land exhaustion), is sufficiently manifest in this State to justify calling in the doctor. When land is new and full of humus or the elements that God supplied it with, it produces a fullness of the crop for which nature intended it, but as this crop is planted year after year certain elements become exhausted, and the result is shown in a gradually decreasing yield. When this condition

becomes manifest the wise farmer begins at once to apply the remedy. He who fails to do so will soon reach the point where yield is less than cost, and only a few years of such farming are necessary to cause him to curse his calling and abandon the home. Few California farms have reached a condition justifying abandonment, but very many of them are showing signs of sickness, and it remains to be seen how many of the owners will prove wise and apply the remedy before it is too late, or foolishly tempt their fate by continuing to ignore nature and her laws until forced by poverty to give way for those who may in time restore the sick and fruitless soil to a healthy condition.

A real progressive, up-to-date, modern farmer will not allow his land to become sick. He watches for symptoms and applies the preventive. When stimulants have not been applied and soil sickness becomes apparent, farmers should realize that to continue on in an indifferent course is suicidal.

Soil sickness is apparent now in most of the California farms, especially the grain farms, and a move so strong that it will reach the farthest confines of the State ought to be started that would have for its object a study of the trouble and a universal application of the remedy. The trouble in nine cases out of ten is overcroping. The remedy is to restore the elements that have been exhausted. This can be done in various ways. On small places where dairy cows, hogs, horses, and poultry are kept the manure, rightly handled, should meet all requirements. But wheat farms are not usually small places, and it is the wheat farms in California that are the greatest sufferers. In such cases the farmer must make up his mind to raise less wheat and more stock, or, while growing wheat on one part of the land, he must grow vegetable matter on the other part that can be plowed under as fertilizer, thus foregoing the profit there might be in the hay or pasture, until it shall come back to him in after years. As the dry plains in the big valleys of California are not so well adapted to the growing of plants of the legume family, which when plowed under are the best soil restorers, it would be well for our farmers to consider the question of raising and feeding more live stock as a means of maintaining, or if needs be, restoring the fertility of their soil without the loss of revenue.

For instance, we would like to see some plains rancher, as they are called, who has, say, 320 acres of land, and who has been continually growing wheat or barley or hay on it for thirty or more years, try the experiment of dividing his holdings into four fields and arrange to have one field lying fallow, one in grain, one in hay, and one in pasture each year. Then rotate these uses and keep as much live stock as all the pasture and all the hay and most of the grain would support and fatten. In other words, turn the grain farm into a stock farm and look for revenue from eggs and milk and meat instead of from the raw hay and grain.

The question of the kind of stock that would be best to keep on such a place might be determined by the individual; it is enough for the purpose of this article to suggest that whether he determines on horses, cattle, sheep, or hogs, or some of each, he will find more profit in the end by starting in with approved breeds.

We know that to turn a grain farm into a stock farm would involve some extra expense in additional fences, buildings, etc., besides the cost

of stocking up, and we know that the first year or two, until the increase reached a marketable age, the revenue would be light, but who can doubt that once established it would be more profitable than the growing of cereals on worn-out land and at less manual labor to the farmer. But the point we want to make is this, that whether more profitable or not, such farming would restore the fertility of the soil, so that after a few years of such rest and rotation and fertilization, if the owner should desire to go back to the growing of grain he would find his sick land had been cured, and capable again of giving him some profit for his pains.

Some system of restoration of failing lands has got to be adopted, and that pretty soon. If there is a better one than is here suggested, let us have it.

Pertinent to this subject we have found in a late issue of the San Jose *Mercury* an article in which the writer says:

"The methods in use in the fresh and fertile lands of the central and western parts of the country are the most irrational and wasteful in the world. Year after year, for twenty, thirty, forty years in succession, the land is planted in corn, or sown to wheat; the entire crop is gathered and sold in the market, and nothing whatever is returned to the soil. What wonder that in time the richest soil in the world will show signs of failing fertility? The process needs only to be carried far enough to result in utter impoverishment. However heavy a man's bank balance may be, if he continually checks against it, and never reinforces it, it will inevitably come to nothing in time. In the older and more populous states farms are generally smaller, are held at higher prices, and they must be cultivated with great care and intelligence or the farmer will go out of business. He practices a regular rotation of crops, which eases the drain on the land and gives it a chance to recuperate. Still more important, he does not sell his crop away from his farm, but feeds it to live stock at home, and thus the crop is in fact returned to the soil in the very best form of fertilizer. The writer of this knows farms, and large farms, which have been in the hands of the same family for a century and a quarter, and which are far more productive to-day than ever before. No ton of hay or of grain is ever sold away; it is always fed to the living animal. A stock farm properly handled, with rotation of crops, ought to grow richer year by year.

Farmers in the great central states are waking up to the danger of exhausting their soil, and to the necessity of changing their methods. Too long have they yielded to a voracious greed to get out the utmost possible, while putting nothing back. For some years now the better class of farmers in those states have discarded wasteful and short-sighted methods, and are now sustaining, and even enriching, their lands. The results are already apparent. This subject has a very important practical interest right here in this section of the country. The soil of this magnificent valley is, for the most part, exceedingly fertile. It does not follow that we can abuse it with impunity. For the last twenty years or so we have been making a tremendous drain on our lands with our vineyards and orchards. These growths are extremely depleting. Next to nothing is done to recuperate the soil, and it is inevitable that in time the exhaustion must become apparent. We can not forever continue making such demands, while giving nothing back, without depleting and exhausting the soil, however rich at first. It is much more difficult and expensive to resuscitate a collapsed soil than it is to sustain soil that is yet full of strength. We believe this to be a matter of concern to those who own and till the land not only, but to the entire region hereabouts."

COTTON GROWING IN CALIFORNIA.

By W. H. Kindig.

For several years past experiments have been conducted with cotton growing in Imperial Valley by individuals who had come from cotton states and who would produce a few stalks in the dooryard as a novelty. It was not until 1909, however, that any attempt was made to raise a commercial crop. Seed was brought from Texas and Georgia, and about 1,000 acres were planted, all being of the short staple variety. Some of this was neglected by landowners who feared they were wasting their time in attempting to cultivate it, but where it was properly cared for the results surprised every one, both in yield and quality. About 600 bales of 500 pounds each were marketed, the larger part going to the California Cotton Mills at Oakland. The fiber is said to be somewhat stronger than a similar variety grown in the South, and as there are no rains to knock the bolls off into the dirt to stain and soil them, the cotton leaves the field in a condition of absolute uniform whiteness, which is very much in its favor.

The yield has been a little better than a bale to the acre even under the disadvantage of the growers, in being ignorant of the best time to plant and irrigate in that section. With the knowledge learned from the last year's experience there is every reason to believe that a yield of two bales to the acre can be reached and maintained easily.

There are four troubles which affect the South in the production of cotton, none of which we have to contend with. One is drouth, another, excessive rainfall, a third is early frost, and a fourth, the boll weevil. Imperial Valley has abundant water, has no rainfall during the growing season, has no frost early enough to stop the opening of the bolls, and on account of the exceedingly dry climate the boll weevil can not live. So the grower in that section can be assured not only of the largest possible yield in a given year, but also of a full crop every year.

The only questions which have been raised as to the production of cotton in Imperial Valley commercially, are the relatively high price of land and of labor. The Southern plantation is usually lean worn-out soil, generally heavy red clay, hard to work and requiring heavy fertilization. It produces from one third to one half a bale to the acre, while Imperial land with its rich alluvial soil, and with all conditions best adapted to the growing of the plant, will produce a bale and a half or more, to the acre. Such a yield will justify a much higher price for land. As to labor, Mexican labor is cheap and efficient, and the gathering of the crop comes at a time when people of all circumstances are flocking to the dry desert regions on account of the climate to obtain more comfortable conditions.

At the price paid for picking cotton this year, one dollar per hundred pounds, no trouble was experienced in getting white help.

A cotton gin was established at El Centro capable of turning out 20 bales of cotton per day, by the American Nile Cotton Company, and the next year will probably see a cotton-seed oil mill in operation. The

seed grown this year will be used for replanting next season because it has been found that acclimated seed will produce a better yield than that which is newly imported. It is estimated that 25,000 acres will be planted next season, and gins established in one or two other towns.

The feature of cotton growing in California which promises best, is the fact that there is now growing in Imperial Valley several acres of Egyptian cotton which will in another season produce seed enough for a commercial crop of this variety. This is of a much longer staple as well as finer, and is used in the manufacture of fine thread, and can not be grown anywhere else in the United States. It brings about twice the price of ordinary short staple cotton, and is not subject to the fluctuation of the market as the demand is always greater than the supply. About fifteen million dollars' worth of this variety is imported into the United States annually, and in the near future it is hoped that a large part of this sum will be diverted to the Imperial Valley.



JOSEPH R. LOFTUS.
Pioneer Imperial County Cotton Planter.

Although all the cotton grown in California would find a ready export market in the Orient, it would greatly benefit the State to have it manufactured within our borders. Eastern capital is now casting about, looking toward the erection of cotton mills in the southern part of the State, and if the amount of acreage is planted as anticipated, it is probable that another year will see the project of cotton mills taking definite shape, and California will be looked to to supply a share of the world's cotton goods.

As this article relates to a new industry in California and therefore may become historical, we append a short extract from the *Desert Farmer* of November 10, 1909, relating an interesting incident, and incidentally giving credit to the founder of the industry, Joseph R. Loftus, who took to Imperial Valley a car load of cotton seed, distributed it among the farmers, with a guarantee that he would see that the crop would be ginned and marketed if successful, and to show his faith planted 250 acres himself. The *Farmer* says:

"On Monday, October 18th, the American Nile Cotton Company completed its ginning plant at El Centro and made its initial run. Quite a large and enthusiastic crowd of citizens as well as visitors were present to witness the ginning of the first bale of cotton raised in the valley.

Promptly at nine o'clock the switch was turned by Mrs. A. F. Andrade, wife of the vice-president of the American Nile Cotton Company, and the wheels started, then in a very incredible short time the flaky cotton which had been separated from the seed, began pouring into the press. It was a novel sight to almost every one

present, and many were the exclamations of satisfaction at the time; but when the press was full of snow white cotton, and it was revolved so as to bring it over the hydraulic stand, it was but a few minutes till the first bale was rolled out and put upon the scales, cheers and hand clapping by those present manifested their enthusiasm. The first bale tipped the beam at 460 pounds, and was from the plantation of Joseph R. Loftus Company, at Meloland. Thus is chronicled the beginning of the greatest commercial proposition that was ever introduced into this great Imperial Valley.

The yield of cotton to the acre is also very gratifying. From a number of growers comes the report that they are getting almost a bale to the acre the first picking, with fully as much more on the plants not yet ripe. When we consider that this is a new industry for almost every grower, and those who have grown cotton before never grew it by irrigation, the results are certainly very satisfactory. With the experience of this year, the yield of next year can be very much increased if not doubled.

Up to the present time there has been 75 bales ginned. The first car, consisting of 43 bales, was shipped on November 6th, and was consigned to the California Cotton Mills Company of East Oakland, Cal. This car brought the grower over $2,500 cash. There will be at least 30 cars more, which means $100,000 gold in the pockets of the Imperial Valley farmers."

THE SACRAMENTO VALLEY.

By A. L. Crane.

The Sacramento Valley has been a great grain and live stock region of California. Fifty years ago nearly all the cereals and vegetables grown in this State were produced in the Sacramento Valley and in the counties bordering the San Francisco Bay, and at that time the most extensive stock ranges were also in this valley. As the land was taken up by incoming settlers the stock men, one after another, went out of business or retired to the mountains. The cereal farmer, starting with a family orchard, soon discovered the adaptability of the soil and climate for the production of superior fruits, and encouraged by the demand for good fruit, which was stimulated by improved transportation facilities, he enlarged his family orchard, or vineyard, to one of commercial proportions; while still others seeing profit in the business bought land and planted fruit exclusively. And thus to-day this great valley, with an area of between six and seven thousand square miles, while still holding prestage as a cereal section, is packing and shipping a large proportion of the immense quantities of fruit that go out of California. As in the earliest days the valley took precedent as a stock range, and later for its grain fields, it seems destined to become the great fruit region of what will no doubt ever remain the great fruit State of the Union.

Except in a few favored sections, it is demonstrated that irrigation is essential to successful fruit culture, and thus far the portion of this great valley that is under irrigation is very small, compared to the whole. But the water is here in abundance and the people are becoming alive to its value when applied to the land. Quite a number of irrigation projects are now in operation and more are being constructed or projected than at any period in the past. Water increases the earning power of the land several fold, and increases its value accordingly, and throughout the entire valley to-day, in every considerable community, men are debating or promoting projects that will supply their land with water. As these projects, whether by companies, communities

or the government, are perfected, one after another, the area of irrigable land increases, the valley and the people grow relatively richer, and the orchard and vineyard and truck farming possibilities increases.

This evolution from cereal farming with profits of $10 to $20 an acre, to fruit and truck farming with profits of $100 to $200 an acre is going on very rapidly, and when we contemplate the day when the entire valley shall be supplied with irrigation facilities, and every one of its 4,000,000 acres, to say nothing about the rich foothills that border it and which contain an almost equal area, are producing the maximum of their possibilities, the output of this portion of California alone will assume proportions that are staggering. But the pessimist exclaims, "What are you going to do with so much produce?" That has always been the cry, and the rapid increase of population and the decreasing opportunity for taking up new farms in the country is the answer. But even with water on all the land all of it will not be planted to fruit and vines and vegetables. Alfalfa is a surer crop, one year with another, than any one variety of fruit, and about as profitable. We must have butter and meat, and we get the maximum of these from a minimum acreage of alfalfa. Hence, while some with irrigation will grow fruit and some vegetables, others will grow alfalfa and supply meat and dairy products. This is the situation; these are the possibilities; so looking to the future, and the not great distant future either, we see twenty homes in the Sacramento Valley where now there is one; we see new villages where now are grainfields or pastures; we see schools and churches multiplied in proportion; and we see this great valley, nature's garden, turning out tenfold its present wealth in the products of the orchard, the vineyard, the garden, and the dairy, products most wholesome and which the people must have.

THE DIFFERENCE IN DOLLARS AND SENSE.

A. P. Sadles, in a recent report issued by the Ohio State Agricultural Society, makes the following pertinent points:

Last summer some thirty Logan County, Ohio, farmers conducted a corn growing contest. Results surprising. Each selected seed which he thought was best. The corn was planted in a field on the farm of Mr. Bridge, near Belle Center. Soil was the same the field over. Planting all done on same date. Each acre had the same cultivation. In October the corn was husked, weighed and tested. Ohio's Corn King, Prof. C. G. Williams, of the Experiment Station, was present and directed the testing. The lowest yield on one acre was fifty-three bushels. The highest eighty bushels. The difference, twenty-seven bushels. This big difference grew on the small acre. The difference between good seed and bad was nine times three. The difference between knowing and guessing at the kind of seed to use was fifty per cent. Twenty-seven bushels made the difference between mixing and not mixing brains with toil and sweat. This contest proved the difference between farming at a profit, and just farming. There is gold in almost any kind of dirt if we know

the alchemy of extraction. The average farmer plants any kind of seed. That's why he is only an average farmer.

The Ohio Experiment Station recently concluded a test which shows the difference. Two cows were given the same care and feed for a year. A record was kept of the cost and income. The profit on the "scrub" was five dollars. The profit on the high grade cow was fifty-two dollars for the year. No difference in the cost. Forty-seven dollars the difference in the profit. Twenty-seven bushels on one acre and forty-seven dollars on one cow are good trade-marks of profit. The difference is dollars and sense. Common sense as well as copper cents. The farmer who is content to raise the "scrub" product should have the benefits of both a laxative and an emetic. When we improve the animal or the plant we also improve the race. A first-class article seldom has a second-class owner. Gold is not found on top of the ground, nor pearls on the shore of the sea. If a man wants gold he must dig. If he wants pearls he must dive. The farmer, to get up stairs in his business, must dig and dive into the fundamentals and essentials of his occupation. Brawn and brain, properly mixed, are the fulcrum and lever by means of which the standards of civilization are lifted up. Let the farmer look about him. Let him learn the value of good seed. Let him see the difference.

THE CALL TO THE NATION.

Additional pertinent points by A. P. Sadles, Secretary Ohio State Agricultural Society:

The call of the nation in agriculture.

Population increasing. Average crop yield decreasing.

The gay, gaudy, gilded city is the candle which lures the human moth into its belly, and by this sign the "producing army" is depleted while the "consuming army" is multiplied. Humanity is manacled to the "bread line" by chains that will not break.

The "staff of life" is a preserver of the peace.

Hungry men have but little respect for law.

At winter's threshold the price of meat and bread ascends, while the wages of him or her who toils by the day or hour, remains the same.

The tide must turn. "Back to the country" must be the slogan, else the nation will not feed itself.

Many who throng the street and narrow alley must away to the fields.

Some who work beneath the roof must go out and toil beneath the sky.

Some must go back and help to plow and farm the earth.

Supply is not keeping pace with demand. The farmer is failing to supply two families in the city while he keeps his own besides.

The farmer sells everything he grows at prices beyond his dreams, but still the cry goes up for more.

No nation was ever overthrown by its farmers.

In the cities hang the red lights and danger signals of this republic.

Other nations have found that high prices and unsatisfied stomachs were tokens of decline and decay.

The farmer must save the country by growing more corn on an acre of ground next year than he did this.

He must prevent his fertile field from becoming a barren waste.

France is the creditor nation of the world. Prosperity abides with her. France maintains 45,000 rural schools with agricultural departments, with gardens and small fields, where systematic, scientific cultivation and conservation of the soil is taught.

For thirty-six years every school in Belgium has maintained at least one fourth of an acre to instruct the pupils in the fundamental principles of farming.

On the roll of honor, in the magnificent and imposing Congressional Library building at Washington, Elihu Vedder placed "agriculture" first of all the arts, sciences, professions and occupations.

"The Call of the Nation" is for the best and most intelligent system of agriculture that is possible.

A PLEA FOR DIVERSIFIED AGRICULTURE.

By Geo. C. Roeding.

In the Middle West and Eastern States, where annual crops are raised, the desired results are obtained by a rotation of crops; and on the larger farms, so that the farmer may not have all of his eggs in one basket, several crops are raised, so that in the event the price on one is low, due to overproduction or some other cause, the others will counterbalance any loss which may be sustained on this account.

Although our agricultural properties are termed ranches, which would imply that they are devoted to the growing of annual crops, they are, in reality fruit farms, where a change in crops is not practicable. After such a place has once been planted the only successful method to follow is to secure the very best possible results from the permanent trees and vines.

Fruit growing in California is a commercial proposition and the raising of a product and the marketing of it by individuals has not been found practical. I have always been of the opinion that the only successful method of growing fruit in California is to have enough of any one product to make the seller a factor in the market. In other words, a man who devotes, say twenty acres to twenty different varieties of fruits, will never be in a position to secure as much for his product as the grower who devotes his energies to a few products and has enough of each one of them to make it worth while for the commercial man to make him a liberal offer for what he has to sell.

There is probably no place in the world where a farmer or fruit grower is in a better position to raise everything he requires for his maintenance than in this valley. It is not surprising that visitors to the exposition of Seattle should find so much attraction in the California building, for of all the buildings on the grounds, there was none which was filled with such a variety of products as that contributed by California. It is only natural that a resident of Fresno should be prejudiced in its favor. The fact it is located in the center of the great San

Joaquin Valley and further that it is the oldest as well as the largest irrigated section in this State to-day, naturally gives it a preference.

It is the first section in this State where a demonstration was made of the possibilities of a farmer to make a good living on a twenty-acre tract and in more recent years tracts of five acres are serving the same purpose.

It is largely due to the efforts of the early settlers that so many experiments were made with such a great variety of fruits, and in consequence of all this, important industries have already been developed or are in the course of development.

As an indication of the field open for new settlers I will take the various fruits in the order of their ripening through the season. To begin with the berries, commencing with the strawberry, followed by the loganberry, dewberries, blackberries and raspberries, have a very important place in the smaller tracts in the vicinity of the larger towns where they find a ready market, or close to a railroad station, where they may be profitably shipped to more distant points.

The next fruits to ripen are the apricots, followed by peaches, plums, prunes, nectarines. In early August the shipping of table grapes commences, which is soon followed by the harvesting of the raisin and wine grapes, and in the latter part of October and November by the shipment of the late ripening varieties of table grapes.

Toward the middle of August the harvesting of our fig crop is in full swing and the San Joaquin Valley, particularly the central section, gives promise of being the great fig center of the State. It holds this position to-day, but the quantity of figs produced is so infinitesimally small, as compared with other fruit industries, that the field for exploitation is indeed a wide one, now that we are raising a fig which is identical with the famous fig of Smyrna.

Among other fruits, which may be successfully and profitably raised, is the pomegranate. It will adapt itself to localities where the water levels are high and in spots impregnated with alkali. The sale of the pomegranate in the Eastern markets has been most satisfactory to growers, and if we eventually succeed in introducing some of the improved types, said to be growing in Syria, in which the hard seed in the pulp of the fruit is almost entirely absent, a wide market for this fruit is sure to be opened up.

Among other fruits of lesser importance, which, however, find conditions congenial to their successful culture, are the persimmon, quince, pecan, loquat.

Had any one advanced the idea fifteen years ago that the San Joaquin Valley would compete with the district south of Tehachapi in orange culture, he would have been regarded as an idle dreamer. To-day growers from the south are coming to Central California, the fact that the same variety of oranges ripens from four to six weeks earlier; that land and water costs less by two thirds than in the so-called favored orange sections has acted as a magnet in attracting attention to this part of the State.

The olive a few years ago was regarded as being adapted to localities where coast breezes prevailed. Experience has shown that this is all a mistake, for the production of fine olives is dependent on a moderately alluvial soil and in a locality where irrigation water is available in the fall of the year to bring the fruit to the highest state of perfection.

Apples are grown on the plains, but the high temperature and dry atmosphere of the summer months are not conducive to long keeping, and for this reason apple growing will be confined to elevations of from three to six thousand feet, where fruits combining flavor as well as keeping qualities are successfully grown. All that is necessary to open this field is a railroad to facilitate marketing.

There are a number of new fruits, which will be eventually grown here, all of which hold an important place commercially in the Old World. The carob, or St. John's bread, a beautiful tree, for aligning our roads, the beans of which are from eight to twelve inches long are very valuable as food for stock; the pistachio, a green almond, used for making pistache candies, and also eaten out of the hand after being roasted, just as we use peanuts.

It would take up too much time to go into further details and it is entirely unnecessary for me to dwell on the importance of our alfalfa, dairy industries, the possibilities of raising hay, Egyptian corn, etc.

To sum the whole matter up in a few words, it is quite evident that every fruit and cereal adapted to the semi-tropic and temperate zones may be successfully grown here, giving us unquestionably a diversity of products found in no other section of the world.

ACHIEVEMENTS IN AGRICULTURE.

The San Jose *Times* of December 4, 1909, summarizes the marvelous achievements in agriculture in the last decade in the United States, as shown from the report of the Secretary of Agriculture for 1909, as follows:

The year 1909 is the most prosperous for the farmer of all years within the past decade. The value of farm products is so large that it is estimated by billions. Secretary Wilson's recent report says: "Eleven years of agriculture, beginning with a production of $4,417,000,000 and ending with $8,760,000,000! A sum of $70,000,000,000 for the period! It has paid off mortgages, it has established banks, it has made better homes, it has helped to make the farmer a citizen of the world, and it has provided him with means for improving his soil and making it more productive."

The most striking fact in the world's agriculture is the value of the corn crop for 1909, which is about $1,720,000,000. It nearly equals the value of the clothing and personal adornments of 76,000,000 people, according to the census of 1900. The gold and silver coin and bullion of the United States are not of greater value. It has grown up from the soil and out of the air in 120 days—$15,000,000 a day for one crop, nearly enough for two Dreadnoughts daily for peace or war. This crop exceeds in value the average of the crops of the five preceding years by 36 per cent.

Cotton is now the second crop in value, and this year's cotton crop is easily the most valuable one to the farmer that has been produced. With cotton lint selling at 13.7 cents on the farm November 1, and with

cottonseed selling for about $25 per ton, the lint and seed of this crop are worth about $850,000,000 to the farmer. No cotton crop since 1873 has been sold by farmers for as high a price per pound as this one.

Third in value is wheat, worth about $725,000,000 at the farm, and this largely exceeds all previous values. The November farm price was almost an even dollar a bushel, a price which has not been equaled since 1881. This is the third wheat crop in point of size, with 725,000,000 bushels.

The hay crop is valued at $665,000,000; oats at $400,000,000; potatoes at $212,000,000, and tobacco at nearly $100,000,000. Beet and cane sugar and molasses and syrup, from farm and factory, will reach the total of about $95,000,000. The barley crop is worth $88,000,000, flaxseed $30,000,000, and 1,000,000,000 pounds of rice $25,000,000.

The production of all cereals combined is 4,711,000,000 bushels, an amount considerably greater than that for any other year except 1906. It exceeds the average of the preceding five years by 6.5 per cent. The value of all cereals in 1909 has never been equaled in a previous year. It is almost exactly $3,000,000,000, or 34 per cent above the five-year average.

Compared with the average of the previous five years, all principal crops are greater in quantity this year except cotton, flaxseed, hops, and cane sugar; but without exception every crop is worth more to the farmer than the five-year average.

CALIFORNIA STATE FAIR.

From the San Francisco Chronicle.

Since the State Fair has ceased to be primarily a gambling arena it has attracted better exhibits and more of them. In spite of the extensive pavilions which have been provided for exhibits, the directors have been obliged to provide five large tents. The State ought to, and doubtless will, provide space for all exhibits which are likely to be offered. The fair opens next Saturday and, from all accounts, will be a real exposition of the products of the State and of valuable exhibits from out of the State which will be well worth seeing.

While it will doubtless take some time for the State Fair to outlive the evil repute resulting from many years of disgraceful administration, it must be remembered that of late years it used to be said that the State was compelled to violate its own anti-gambling laws and condone the criminal misapplication of money appropriated by the legislature, because otherwise the gate receipts would not pay the expenses. That has not, we believe, proved to be the fact, but, whether it has or not, the argument was founded on false premises. It is not essential that the State Fair should pay expenses. That is, of course, desirable, but a properly conducted state fair is an educational institution entitled to maintenance, regardless of gate receipts. If the premiums are sufficient to secure adequate exhibits of desirable live stock, machinery or other things of value to the public, the fair will be attended by the majority of those who are in a position to directly profit from what they learn,

and the benefit which they gain will be gradually diffused among the people. A good state fair is well worth any moderate cost above the income from the gate receipts and privileges. Apparently the fair this year is to be a good one.

VALUE OF FAIRS.

From the Portland, Oregon, Rural Spirit.

The *Rural Spirit* has for years been a promoter of agricultural fairs and live stock shows. We believe they are a necessity in promoting better methods of farming and breeding and are a great value to the farming class socially. They have their place in civilization alongside of our agricultural colleges. They are schools of comparison where one article or one animal or breed are shown to be better than others, they show the progress we are making or not making as the case may be. In speaking of fairs the *Daily Journal* of this city very ably says:

"It is a good sign for Oregon that the late fair at Salem is everywhere acknowledged to have been 'the best in the history of the state.' A fair is a civilizer. It is a powerful adjunct of progress. It is effective in awakening inspiration for producing superior things. The true secret of advancement is comparison by which one product, one article or one method is shown to be better than others. If there had been no comparison, and no corresponding incentive to discover and utilize something better we would still be living in caves and eating nuts and raw flesh in the primitive wilderness. A sure means of development is to inspire rivalry, and that is what the competitive exhibits at the state fair or any other fair do. This is universally recognized, and is in fact the reason for state fairs, expositions and other places where there are competitive displays. In the older Eastern States it is so well understood that the annual fairs are a standard adjunct of state life, with universal attendance, and a wide appreciation of their value to the commonwealth. For these and many other obvious reasons, the results at Salem are gratifying and should be made the basis for future improvement, with a determination that each year's fair shall continue to be 'the best in the history of the state.'"

HEMP CULTURE IN CALIFORNIA.

San Francisco Commercial News, October 18, 1909.

The cultivation of hemp in California is in its infancy, although tests made indicate, as recognized by the Agricultural Department at Washington, that this State is most favorably adapted for this industry, much more so in fact than Kentucky, which now cultivates some 20,000 acres. In sections of the Sacramento and San Joaquin valleys as well as elsewhere in California there are many thousands of acres of loamy soil admirably suited for the production of a good quality of hemp and practically no irrigation is required after the plant is once well started. It is an annual of the herbaceous variety, is easily cared for, and it is

claimed that a net profit of $30 to $35 per acre can be realized by the growers. This being the case, there appears to be no valid reason why this State ought not to produce $25,000,000 or more of hemp per year.

In a recent issue of the *Commercial News* we stated that G. William Schlichten, the president of the International Fiber Company, was in San Francisco and that a test of their hemp decorticating machine was to be made at the ranch of Thomas & Ettlinger, Ryer Island, near Rio Vista, where hemp is being successfully cultivated. This event took place with satisfying results to all concerned.

Edward Everett, manager of the Tubbs Cordage Company, was present at the demonstration. He says: "The hemp grown in Ryer Island is of good quality, and so far as I could determine the machine did its work well, fulfilling every claim made for it."

James Rutherford of the California Cotton Mills, Oakland, was also in attendance, and we understand the operation of the machine received his unqualified approval. The machine strips the fiber from the stalk in the field, thus simplifying matters for growers. Twenty-five of them are now being constructed by the Union Iron Works and additional orders will be placed. At first these will be used in the Imperial Valley in connection with the wild hemp which grows abundantly when the Colorado River overflows, there being several hundred thousand acres available. This wild hemp is suitable for binder twine and cordage, and the waste will be utilized as a paper pulp, it being superior to that made from linen rags.

Something like $70,000,000 of hemp is imported into the United States annually; about $30,000,000 of it is Manila fiber, $20,000,000 sisal from Old Mexico and $20,000,000 of the soft fibers, such as hemp and jute. Most of the hard fibers come from Manila and Yucatan, the California hemp being of a softer variety, well adapted for twine and other purposes. The market for hemp, local and foreign, exists and the soil as well as the climate of California are decidedly favorable for its growth.

H. Beveridge, now with Parrott & Co. of San Francisco, has been advocating this industry for many years, fully comprehending its importance. He says that cutting of hemp on the Rindge ranch near Stockton will commence immediately, there being 150 to 200 acres in crop. John Heaney on Ryer Island has about 100 acres in hemp which will be harvested forthwith.

Right now there is in transit to New York 300 tons of this fiber, grown in this State, which was sold to the largest linen thread mills in the East.

ALFALFA GROWING IN CALIFORNIA.

By Rev. D. Edmiston.

[This article is from a former report of the California State Agricultural Society, and is republished this year in deference to a constant and increasing demand for information on this subject.]

Were I called upon to express an opinion as to what single product of the soil would probably assume the greatest importance in our State within the next century, I would not hesitate to say alfalfa. As a forage plant for general use, as far as I know, it has no equal in value. This may be said not only in regard to its enormous productiveness, but as well in regard to its excellence as a feed, particularly for horses and cattle. For teams doing ordinary work on the farm, and for milch cows, it answers the purpose of both hay and grain. I feed no grain to my teams, and they not only stand work well, but they keep in good condition and in good flesh.

With our almost perpetual summer and with soil specially adapted to its growth, who can estimate the extent to which its production may be pushed in almost every part of our State? And who in imagination can look forward to the middle of the twentieth century and contemplate the vast number of profitable dairies, the fat beef cattle and fine horses raised on alfalfa, either in pastures or after made into hay, without pleasure and gratitude to the Bountiful Giver of so rich a heritage?

REQUIREMENTS.

But I am reminded that alfalfa can be successfully grown only where water for irrigation is abundant. However, there are occasional tracts of moist land where it does fairly well, though its cultivation on such land is attended with difficulties unknown on land which must be irrigated. The busy gopher works three hundred and sixty-five days in the year. And there are grasses, particularly Bermuda grass, which spread on such land with great rapidity and in a few years destroy the alfalfa. In making such large claims as to the extent and importance which alfalfa culture is destined to assume in the near future, I am met by the objection that the scarcity of water will for all time be an insuperable difficulty in the way. It is true that in many places water can only be obtained at great cost of capital and labor. Nevertheless, we can not doubt but that there are millions of acres of choice lands suitable for the purpose now lying waste which will be provided with water long before the middle of the twentieth century. It is only a question of capital and labor collecting and saving the enormous precipitation in our mountain districts. The rich valleys and plains extending from the southeast to the northwest in an unbroken chain for eight hundred miles were not planned by the Great Architect to remain forever waste. Whoever thinks so has studied the greatness of our State to little purpose.

SUITABLE LAND.

In southern California alfalfa will do fairly well on almost any land suitable for grain growing or orchard purposes where water can be secured in abundance for irrigation. And as a rule every farmer and

orchardist who has such land will find it to his interests to grow a sufficiency for his teams and a cow or two. But it should be understood that there is a great difference in the adaptability of land, even in the same neighborhood, to alfalfa growing. And one who has chosen this industry as a prominent branch of his business should carefully select his location, as success or failure may hinge on the choice made. A porous subsoil which will take water freely can scarcely fail to give large crops if properly irrigated. There is ample fertility in almost any of our mesa lands to produce well if the roots can freely penetrate the subsoil. But there are tracts of land with fine surface soil which can not be made to produce heavy crops, simply because neither the water nor the roots can penetrate the underlying hardpan or tough clay subsoil. I have had some unpleasant experience in this direction, against which I would guard the inexperienced. In selecting land for this purpose one should not take surface appearances. He should dig down and find out what is under the surface, else he may be deceived.

PREPARING THE LAND.

Burn or remove all weeds and rubbish before plowing. If there are small mounds or hillocks which need to be removed with the scraper, it is much easier to do it before plowing the whole surface, as the low places, where the dirt should be dumped, may then be readily seen. And whatever leveling is needed should be done with reference to the location of the irrigating ditches. It is very important that the general lay of the land be accurately ascertained, either by a competent engineer or by the actual running of water. After the ground has been leveled as thoroughly as possible with the scraper, it should be well plowed and the surface carefully pulverized. All dead furrows should be filled and some suitable instrument used to make the surface level and smooth. A piece of square timber, twenty-five or thirty feet long, weighted down so as to make a load for two teams, one hitched at each end, and drawing it sidewise over the land, will level the surface as well or better than any other contrivance I have seen at work. And, as this is done rapidly, it is well to go over the land two or three times, changing the direction each time. This will put the ground in fine shape for irrigating, if the general level has been secured, and it will somewhat pack the loose ground and thus prevent the young alfalfa plants from drying out if the north wind should blow, and enable the roots more readily to fasten in the soil.

LAYING OFF FOR IRRIGATION.

For convenience and economy in irrigating, a ten-acre lot should be divided into three or four equal blocks. I have had considerable experience with five-acre blocks (twenty by forty rods); but I have always found them too wide for the equal and easy distribution of water. The water would stand over parts of the block longer than necessary before it could be forced over other parts. Consequently, the water is not equally distributed, some parts receiving more than is necessary and other parts not receiving enough.

AMOUNT OF SEED REQUIRED.

The amount of seed sown is not a matter of so great importance as the manner of sowing and covering. Nothing heavier than a horse rake, lightly run over the ground, should be used. A brush, or a considerable bunch of brush, fastened together, answers the purpose well. All that is wanted is to imbed the seed somewhat in the fine dirt on the immediate surface. It doees not matter much if much of the seed remains in sight. Indeed, if the sowing is followed by a heavy rain or by flooding the ground, so as to insure a moist surface for four or five days, it is all right without any covering at all. Two years ago I sowed a block, and when about half of it was lightly covered a heavy rain drove us in. I never had a finer stand, the uncovered part being just as good as that which had been covered. Thus treated, ten pounds to the acre will make a very thick stand—even more than is needed. I once sowed ten pounds to the acre on one-half a ten-acre tract and seven pounds per acre on the other half; and after it came up no one could have told the difference. It was all abundantly thick. Then, if you cover very lightly as above, or see that the ground is wet by rain or by flooding, ten pounds of seed per acre is the greatest plenty. But if one insists on covering with a heavy harrow, or an ordinary cultivator, as grain is covered, a heavy investment in seed will be required, as a very small part of the seed sown will ever send a plant to the surface.

CUTTING AND IRRIGATING.

After sowing and seeing that the ground is properly wet, nothing further will be required until the ground needs irrigation. But when the alfalfa gets six or eight inches high it should be mowed. This will check the weeds and cause the alfalfa to branch and to grow with much greater vigor than if left uncut. Through the first season the ground should have a good flooding after each cutting, and oftener if needed. It will grow all the faster if flooded once in every three or four weeks. If sown in the winter or early spring, the first season ought to make three or four tons per acre, if properly cared for. However, the first season's crop will vary greatly on different soils—much more than in following years.

MAKING HAY.

It will be well to begin cutting quite early in the spring, especially if one has a good deal to cut, but no definite date can be given, as the seasons vary greatly. It is a mistake to wait for the alfalfa to become large and show signs of blossoming. By cutting the early growth about the time the warm spring days begin to come, though it may make only a light crop, the new growth will start with vigor, and at the end of a month, when ready to cut again, you will probably have a ton per acre more than if the two cuttings had been thrown into one, and the hay will be of much better quality.

There is another important advantage in early cutting. Foxtail grass often spoils the first cutting of hay for horses. But if cut before the grass head begins to harden it is entirely harmless, as it will not fasten in a horse's mouth at this stage.

CONDITION AT CUTTING.

Throughout the season great care should be taken to cut promptly when the alfalfa has reached a proper state for making first-class hay. Of course, there are different opinions as to what the "proper state" is. I can only give my own opinion and the reason for it. And that opinion is that it should be cut before the stalk begins to harden, as it always does as the buds mature and the blossoms begin to open. If it stands longer, the quality of the hay deteriorates much more than the additional growth can compensate for. But there are those who want it to stand longer. They say that it makes better feed and has more substance in it. This is true, if woody substance is desired, but it is not true if nutriment is the object in view, if we may rely upon the tables and statements made in Farmers' Bulletin No. 31 of the United States Department of Agriculture. On page 18 it is said: "The percentage of nitrogenous compounds in the plant varies considerably, the maximum being in the early stages of its growth and the minimum about the time the seed commences to ripen. Hence, hay cut early, especially before the plant begins to bloom, is more nutritious than that cut after it has begun to bloom." The writer gives the analyses of hay made at four different periods in the growth of the plant, showing that the statements just made are correct from a scientific point of view. And I feel sure that experience will lead any careful observer to the same conclusions.

LOCAL EXPERIMENTS.

About two months ago, after feeding my cow for some time on hay which had been cut when in bloom, I changed to hay cut before it began to bloom, and at once her flow of milk increased at least one fourth. And my neighbor, Mr. H. D. Noland, tells me that in the same way the weight of milk given by his herd had been very greatly increased just as soon as changed from hay made in the ordinary way to that made from tender, young alfalfa. Another point in favor of early cutting is worth considering. Cows will then eat the stalks clean, wasting nothing. But if it stands until in bloom, when the stalks become woody, they can not be induced to eat them, often wasting one fourth of the weight. Hence, I am fully convinced that one making hay for his own use will find it decidedly to his advantage to cut before stalks begin to harden. And in making hay for sale it will be just as much advantage to his customers, and will be better all around, if they can be induced to pay a little more for such hay to make up for the loss in weight in cutting before it is fully grown.

SUGGESTIONS.

I would never cut at one time more than can be raked and put in cocks in the forenoon of the next day, if it is in the hot and dry summer months, or in the forenoon of the first day after it is sufficiently cured. However, the very early or very late cuttings, when the only difficulty is to get it dry enough to keep, may be handled in the afternoon without breaking the leaves and losing them. But through much of the season alfalfa hay should never be touched in the afternoon, or after the leaves begin to break.

One should never cut and put in the cock forty or fifty acres, as I have often seen done, before beginning to haul it in. Hay thus treated is scarcely worth more than half price, to say nothing of the delay of one week, or perhaps even two weeks, in irrigation which this method requires. One can not afford this loss. When I have sixty or seventy acres to handle, I generally cut about five acres in the morning and put in the cock the same amount cut before, and come as near as I can to hauling the hay from five acres each day. But I generally find it necessary to stop cutting a day or two each week to catch up with the hauling. When the weather is very dry and hot we think it pays to go to the field as soon as it is light, and lay off for the remainder of the day when the hay becomes too dry.

We find it a great convenience and economy of time and labor to have large and convenient racks on our hay wagons. We use flat racks, eight by sixteen feet. On one of these we can, without high pitching, conveniently put on a load of two tons, and without any danger of its slipping off on sloping ground. A two-ton load on such a rack is about twelve feet wide and eighteen feet long, and no higher than a ton load on the kind of racks I often see used. And the average team can haul two tons on our hard roads easily, and it saves much time when one is hauling three or four miles.

A TRIBUTE TO THE DOG.

During the course of an address to the jury in the trial of a lawsuit, Senator Vest paid the following beautiful tribute to the dog. When he finished the jury was in tears:

"Gentlemen of the jury: The best friend a man has in this world may turn against him and become his enemy. His son or daughter that he has reared with loving care may prove ungrateful. Those who are nearest and dearest to us, those whom we trust with our happiness and our good name, may become traitors to their faith. The money that a man has he may lose. It flies away from him, perhaps when he needs it most. A man's reputation may be sacrificed in a moment of ill-considered action. The people who are prone to fall on their knees to do us honor when success is with us may be the first to throw the stone of malice when failure settles its clouds upon our heads. The one absolute, unselfish friend that man can have in this selfish world, the one that never proves ungrateful or treacherous, is his dog.

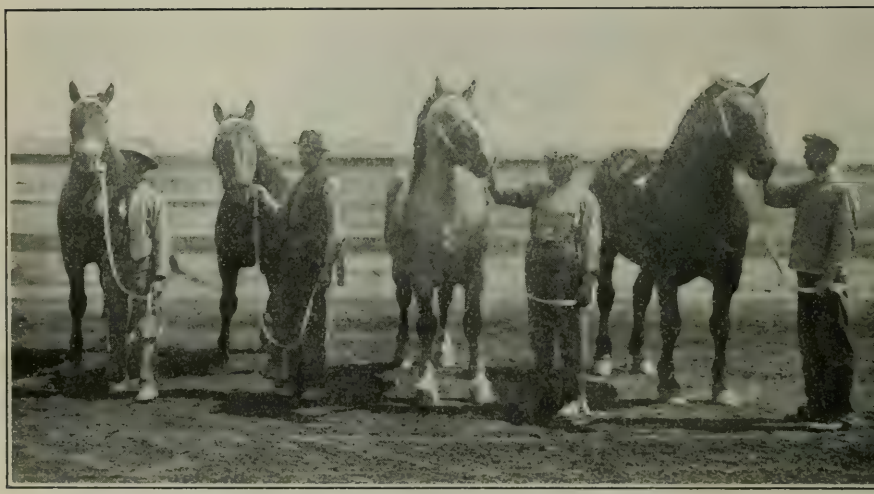
Gentlemen of the jury, a man's dog stands by him in prosperity and in poverty, in health and in sickness. He will sleep on the cold ground, where the wintry winds blow and the snow drives fiercely, if only he can be near his master's side. He will kiss the hand that has no food to offer, he will lick the wounds and sores that come in encounter with the roughness of the world. He guards the sleep of his pauper master as if he were a prince. When all other riches take wings and reputation falls to pieces he is as constant in his love as the sun in its journey through the heavens. If fortune drives the master forth an outcast in the world, friendless and homeless, the faithful dog asks no higher privilege than that of accompanying him to guard against danger, to fight against his enemies, and when the last scene of all comes, and death takes the master in its embrace, and his body is laid away in the cold ground, no matter if all other friends pursue their way, there by his graveside will the noble dog be found, his head between his paws, his eyes sad but open in alert watchfulness, faithful and true even to death."

RESOURCES

OF THE

STATE OF CALIFORNIA.

(BY COUNTIES.)



DRAFT HORSES, CALIFORNIA STATE FAIR, 1909.

ALAMEDA COUNTY.

Alameda County fronts on the bay of San Francisco for a distance of 38 miles, with an average width of 25 miles, extending to and beyond the summit of the Contra Costa hills, comprising numerous beautiful valleys, besides the broad Alameda Valley, which last is bounded by the waters of the bay on the one side and the Contra Costa hills on the other, and is one of the richest and most fertile valleys in the State. The principal stream is Alameda Creek. There are other creeks crossing the county and emptying into the bay, two of which furnish water for the city of Oakland. The country around Hayward is one of the great fruit-raising regions, many millions of pounds being shipped annually.

The soils immediately along the bay in Alameda Valley and the marshes formed by the overflow are heavy, but very fertile when reclaimed. Then comes a broad belt of rich, black adobe that is crossed by deposits of alluvium made by shifting channels of streams running down from the Coast Range. In the Niles region are lighter loams. About Livermore are uplands, bench and valley lands. Between the latter two classes the variation in potash, lime, and phosphoric acid accounts for difference in grape crop. Mission San Jose is characterized by gravelly, upland, adobe soil, and was evidently chosen by the padres of the old Spanish mission for its exemption from frost, caused by its slight elevation above the surrounding valleys. The Pleasanton section consists of agricultural and grazing lands. The soil is a very rich sediment, producing hay, grain, potatoes, hops, and beets in abundance. At Alvarado the surrounding country is a fine farming and fruit region, and gardening and dairying are largely carried on. The fertile, alluvial soil is finely adapted to fruit-growing.

The average rainfall of the county is about 30 inches.

Alameda County was among the first to begin the planting of orchards and vineyards. The county is divisible into three sections—the cherry district, the apricot district, and the vineyard district.

From Oakland to Hayward is the home of the cherry, and in an ordinary year this crop is good for a profit of a quarter of a million dollars.

The apricot section includes all the region east and south of Hayward, but the center is at Niles. The Alameda apricot is high colored and the flavor exquisite. One of the most popular varieties, the Alameda Hemskirk, was originated here. The other varieties preferred are the Blenheim and the Moorpark. A first-class apricot orchard is easily worth $500 per acre, and some could not be bought for $750 or $800. Apricot trees yield from twelve to twenty tons per acre, worth from $20 to $30 a ton. Thousands of carloads of apricots are shipped annually from this county.

While cherries and apricots are the king and queen of fruits, there are others which do well, among them being the Bartlett pear. The plum is another fruit which thrives, and the smaller fruits and berries are profitably grown.

In Alameda County are the largest currant patches in the United

States. The size of an average currant farm varies from twenty to forty acres. Local canneries pack a great number of cases of this fruit, and thousands of chests of currants are shipped away each year.

Almonds, chestnuts, English walnuts, pecans, beechnuts, and hazelnuts are extensively cultivated.

Alameda is par excellence a vegetable-producing county. It has led in this industry for a long time, and the area devoted to vegetables has been increasing at a rapid rate, since the profit in peas, potatoes, tomatoes, rhubarb, asparagus, and several other vegetables is large enough to tempt the owners of the best soil to go into the business.

There are 8,000 acres devoted to vegetables in the county, not including sugar beets, which would add 4,000 or 5,000 acres more.

Many acres in this county are planted to tomatoes, which prove to be a most profitable crop. It is not unusual to find 100 acres of tomatoes growing upon a single farm.

The potato crop is of increasing importance, since it has been found that there is good money in the big Burbank potatoes and other commercial varieties. The best soil will produce from 75 to 80 sacks to the acre, although record yields of 150 sacks have been produced.

The growing of peas for canning has assumed importance. The output of the San Leandro cannery, located in this county, has reached as high as 1,200 cases per day, and 3½ tons of peas have been grown upon a single acre.

One of the prosperous agricultural industries is the growing of rhubarb for the California and Eastern markets.

California was the first State in the Union to manufacture beet-sugar on a commercial scale. In Alameda County it has been manufactured for the past thirty-three years. Within her borders is located not only the pioneer beet-sugar factory of this country, but also one of the largest factories in the world. The annual production of beet-sugar in California exceeds that of any other State. Beets in Alameda County average over 14 per cent sugar of 88 per cent purity, and they yield an average of 15½ tons to the acre. The planting season extends from the first of February to the middle of May. This provides a long period of activity for the factory, which begins operations in August, and has continuously maturing crops of beets to handle.

The average annual output of salt recovered from San Francisco Bay, in Alameda County, is 100,000 tons, including both coarse and fine salt.

Oakland is the county seat, located on the bay opposite San Francisco, and has for its immediate neighbors the cities of Berkeley and Alameda. These three cities are very prosperous and have a rapidly increasing population.

The University of California is located near the city of Berkeley, and has an average attendance of 3,500 students.

STATISTICS OF ALAMEDA COUNTY, 1908-9.

General Statistics.

Area 840 square miles, or 537,600 acres.		Railroads, steam—miles, 200; assessed value	$6,075,375
Number of farms	2,482	Railroads, electric—miles, 158; assessed value	$5,198,900
Number of acres assessed	465,726	Electric power plants—5; assessed value	$2,425,125
Value of country real estate	$20,100,000	Electric power lines—miles, 100; assessed value	$200,000
Of improvements thereon	$7,400,000		
Of city and town lots	$96,950,000		
Of improvements thereon	$55,800,000		
Of personal property	$26,500,000		
Total value of all property	$210,512,357		

STATISTICS OF ALAMEDA COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	1,280	1,825	$109,500
Barley	8,273	10,898	408,675
Oats	2,498	2,533	126,650
Corn	465	1,170	35,100
Total cereals	12,516	16,426	$679,925
Alfalfa hay	685	3,775	$45,300
Grain hay	54,375	72,499	1,268,632
Straw, bales	24,690	.....	12,345
Total hay	55,060	76,274	$1,326,277

Fruits, Vegetables, Etc.

	Total Production.	
Green—	Pounds.	Value.
Apples	901,775	$31,562
Apricots	3,354,000	67,080
Asparagus	2,462,000	255,680
Blackberries	975	3,412
Beans	480,775	24,038
Beets	50,000	250,000
Cabbage	5,380,000	269,000
Carrots	7,136,000	142,720
Celery	5,632,000	563,200
Cauliflower	848,100	42,405
Corn	550,000	137,500
Cucumbers	804,000	12,060
Currants	225,175	11,258
Cherries	525,775	26,288
Figs	15,000	1,500
Gooseberries	22,125	1,106
Grapes	21,402,000	428,048
Lemons, boxes	600	1,800
Loganberries	175,000	8,750
Onions	3,684,000	73,680
Oranges, boxes	975	4,775
Olives	420,000	10,500
Pears	1,250,000	25,000
Peaches	550,575	16,517
Peas	4,775,125	191,025
Pumpkins, tons	5,000	25,000
Plums	875,725	43,786
Irish potatoes	9,725,825	195,516
Sweet potatoes	250,000	7,500
Prunes	2,750,895	137,544
Quinces	25,000	750
Raspberries	1,295	6,475
Strawberries	1,500,000	60,000
Tomatoes	18,220,000	364,400
Rhubarb	2,895,895	144,794
Squash	636,500	16,412
Walnuts	308,200	30,820
Total		$3,631,893
Dried—	Pounds.	Value.
Almonds	204,800	$40,960
Apples	51,125	5,112
Beans	542,000	16,260
Chestnuts	1,800	180
Onions	875,750	13,136
Pears	27,515	1,375
Peaches	200,000	20,000
Prunes	325,175	32,517
Walnuts	47,775	7,166
Garlic	493,950	24,697
Vegetables in general.	.....	250,000
Vegetable seeds	.....	75,000
Total		$486,403
Canned—	Cases.	Value.
Fruits and vegetables, all kinds	948,828	$2,010,128

Fish Industry.

	Value.
Oysters	$150,000

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	18,035	9,025	27,060
Apricot	67,080	39,782	106,862
Cherry	13,144	6,995	20,139
Fig	300	250	550
Lemon	750	350	1,100
Olive	8,400	4,543	12,943
Orange	1,200	521	1,721
Peach	11,012	5,999	17,011
Pear	31,250	7,295	38,545
Plum	17,515	4,021	21,536
Prune	110,036	25,713	135,749
Quince	1,000	555	1,555
Total fruit trees	279,722	105,049	384,771
Almond	4,096	7,995	12,091
Chestnut	72	21	93
Walnut	6,164	2,798	8,962
Total nut trees	10,332	10,814	21,146
Grapevines, acres	2,140	100	2,240
Berries, acres	525	.....	525

Poultry and Eggs.

	Dozen.	Value.
Chickens	20,125	$120,750
Ducks	675	6,075
Geese	275	3,300
Turkeys	581	16,732
Eggs	1,610,000	644,000
Pigeons	417	1,251
Total value		$872,608

Live Stock Industry.

	Number.	Value.
Cattle—Beef	5,225	$209,000
Stock	12,725	381,750
Dairy cows—Graded	10,000	300,000
Thoroughbred—		
Guernsey	10	18,840
Herefords	100	
Holsteins	200	
Jersey	100	
Polled Angus	1	
Red Polled	10	
Shorthorns	50	
Calves	9,000	45,000
Swine	5,112	61,344
Horses—		
Thoroughbred	1,115	223,000
Standard-bred	872	174,400
Common	21,725	2,172,500
Colts	14,042	702,100
Jacks and jennies	6	1,200
Mules	275	55,000
Sheep	10,125	60,750
Lambs	8,125	28,437
Angora goats	201	2,010
Common goats	250	1,250
Total stock all kinds	99,269	$4,436,581
Wool, pounds	160,000	.....

Dairy Industry.

	Production.	Value.
Fresh milk, gallons	7,895,715	$1,579,143
Butter, pounds	3,000,000	900,000
Cheese, pounds	7,775	1,399
Total		$2,480,542

Miscellaneous Products.

	Amount.	Value.
Honey and hives	.....	$2,250
Nursery stock, flowers, plants, etc.	.....	500,000
Sugar beets, tons	35,000	175,000

STATISTICS OF ALAMEDA COUNTY, 1908-9—Continued.

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	3,225,125	$806,281
Sweet wines	498,875	249,437
Beer, barrels	175,025	2,362,837
Brandy	250,000	125,000
Vinegar	81,000	8,100
Carbonated and soda waters	.....	550,125
Total		$4,101,780

Manufactories.

	No. of Employees.	*Value of Product.*
Bookbinderies	675	$2,245,125
Paper boxes	73	151,150
Wood boxes	102	275,750
Borax	44	875,000
Brick	300	1,725,000
Brooms	95	75,000
Caskets	27	100,000
Carriages and wagons	75	275,750
Cotton, silk, and jute	600	2,002,125
Cigars	75	500,000
Clothing	625	2,750,125
Coffee, spices, etc.	150	447,775
Confectionery	575	1,750,000
Fertilizer	51	114,685
Bags, tents and awnings	151	850,000
Electrical supplies	25	150,000
Flouring mills and health foods	800	1,275,000
Foundries and iron works	49	475,125
Furniture	75	500,175
Ink	32	325,000
Jewelry and goldleaf	20	125,000
Leather goods and gloves	259	700,775
Lime	3	2,500
Machinery	2,895	15,785,225
Malt	16	55,000
Matches	23	127,875
Meat products	600	
Hides	.....	449,985
Lard	.....	49,775
Meat packed	.....	3,099,995
Tallow	.....	34,550
Cocoanut and linseed oil	45	572,300
Olive oil	25	50,000
Paints, etc.	300	1,875,125
Pickles and pickled olives	25	154,500
Pumps	15	50,000
Sewer pipe	150	750,000
Planing mills	1,419	4,750,150
Potteries	50	500,000
Salt	200	500,000
Soap	48	260,000
Artificial stone and crushed rock	600	2,850,775
Wire	17	500,000
Knitted goods	93	500,000
Organs and pipes	5	75,000
Marble	7	50,000
Carbonic acid gas	25	100,000
Sal soda	5	132,000
Sugar, beet	230	700,000
Syrups and extracts	25	130,000
Spring beds	20	75,000
Tanneries	25	250,000
Rugs and carpets	44	100,000
Tin and galvanized iron	60	425,000
Willow and wooden ware	30	50,000
Wood turning and store and office fixtures	55	500,000
Patent roofing	48	500,000
Powder and fuse	116	580,000
Rubber and waterproof goods	54	167,775
Yeast	8	30,000
Iron pyrites	10	35,000
Totals	12,184	$54,006,090

Manufactured Output.

Unsegregated output	$2,243,985

ALPINE COUNTY.

The topography of the county is that which the name Alpine would imply, and its resources are those that are common to mountainous regions, there being large undeveloped bodies of mineral bearing ore, inexhaustible supply of timber, also thousands of acres of fine summer grazing, though not available at this time on account of arbitrary restrictions imposed by the department of forestry, but with the impending meat famine, due to the present method of the department of allotting more area to one favored individual than he can use, and thereby causing a decrease of about 60 per cent of live stock production, and indirectly encouraging a manipulation of the industry which will sooner or later cause public opinion to revolt against so-called policies, and it is to be hoped that in due time that the extensive grazing resources of the mountain counties may be entirely utilized.

Alpine County has no railroads, though the prospects are very good for the construction of one. There are several very feasible routes to cross the Sierras, where short submountain tunnels would materially reduce the grade.

A matter of vital importance to the county would be the extension of the Lake Tahoe state road to connect with the Alpine County road in order that the county might have an outlet to the other counties of the State, and would only require a ten-mile extension.

The county is the source and watershed of more high head power developing streams that any other county in the State.

This county reports 32 farms, with production as follows:

STATISTICS OF ALPINE COUNTY, 1908-9.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	716	573	$21,774
Barley	140	156	4,104
Oats	204	211	6,120
Total cereals.	1,060	940	$31,998
Alfalfa hay	800	2,200	$13,200
Grass hay	1,300	1,700	11,900
Total hay			$25,100

Dairy Industry.

	Production.	*Value.*
Butter, pounds	83,000	$24,900

Fruits, Vegetables, Etc.

Green—	*Production. Pounds.*	*Value.*
Apples	110,000	$2,200
Beans	1,800	55
Beets	3,000	45
Cabbage	6,000	360

Fruits, Vegetables, Etc.—Continued.

Green—	*Production. Pounds.*	*Value.*
Corn	4,000	60
Onions	5,000	100
Plums	1,500	45
Irish potatoes	254,000	3,175
Total		$6,040

Live Stock Industry.

	Number.	*Value.*
Cattle—beef	405	$14,580
Stock	1,100	22,000
Dairy cows—Graded	377	15,800
Swine	600	4,080
Horses—		
Standard-bred	72	10,800
Common	160	6,400
Sheep	32,000	147,200
Total		$220,860
Wool, pounds	110,000	$17,600

In addition to the foregoing, the county reports 9,000 dozen eggs worth $2,250, and 12,000 pounds of hides, value not given.

AMADOR COUNTY.

Amador adjoins El Dorado County on the south, Alpine on the west, Calaveras on the north, and Sacramento and San Joaquin counties on the east. It is inland and occupies the east central portion of the State. It has no navigable rivers. The Cosumnes forms a part of its northern boundary and the Mokelumne forms its entire southern boundary. Both of these rivers are tributaries of the Sacramento. Varying, in the main, in altitude from 30 feet to 1,500 feet and in temperature from 30 degrees to 100 degrees Fahrenheit; having an average annual rainfall of 29 inches; and having land possessing every ingredient requisite in most productive soil; the county has never failed to produce a crop. There is no climatic condition of any portion of California, except the climate of the immediate seashore, but that may be found here. There is no product of any portion of the State but that may here be fostered.

The greater portion of the county being a rolling or foothill region, is adapted to the cultivation of any kind of farm, of horticultural, or of viticultural product.

Grain, hay, spuds, the peach and the apple, and the raisin and the wine grape, can not be excelled elsewhere in flavor or in general appearance. In many parts of the western portion of the county, a great variety of vegetables is grown throughout the year.

Yielding (as the county does) an abundance of the best natural grasses, it offers inducements to stockmen, many of whom are awakening to a more full realization of the adaptability of this section to stock raising.

Distinctively the county is a region of mineral deposits Besides what is used locally, two car loads and upwards of potter's clay and more than one car load of coal, are daily shipped from the county. We hope soon to have as large a shipment of fire brick. Silica is being shipped to outside markets. Other exports are lime rock, granite, marble, sandstone, greenstone, talc, and copper. The one resource, however, that is paramount, is gold from the quartz mines. Ten large quartz mines are at present operating on a most satisfactory basis.

Our county is easily reached and is healthful. A miner here does not have to endure the cold of the Klondike nor the hardships of the Nevada mining districts. Everything is favorable to the operation of mines here. Well constructed roads make the quartz zone accessible at any point. Wood and coal for fuel are at hand; fuel oil is brought by railroad immediately upon the great quartz zone—the famous "Mother Lode"—which traverses the county from southeast to northwest. Water supplied by canals leading from mountain lakes in the Sierra Nevada mountains, is used for motive power and for irrigation and for domestic purposes as well.

Electric power is also available. The Pacific Gas and Electric Company of California has an electric plant located upon the Mokelumne River, six miles from Jackson, the county seat. This electric works

has a capacity of 27,000 horsepower, which power can operate all of the machinery of Amador County for many years hence, and is at the same time sufficient for all other local purposes. Besides this, a large amount of power is supplied to the bay cities.

An estimate made from reports of cruisers, who have recently been over the timber belt, shows that there are in the county 10,000,000,000 feet of standing timber, most of which is sugar pine, yellow pine, spruce, fir, cedar, and different varieties of oak. Although not in such great abundance, there are many other kinds of timber.

The timber belt has from 1,000 feet to 4,000 feet greater altitude than the main mineral zone— the "Mother Lode"—which separates two regions of widely divergent interests. The resources of the western section are millstuffs, products of the farm, the garden, etc., coal, pottery, fire brick, lime, and merchandise in general. The resources of the eastern region are lumber, round timber, lagging, shakes, shingles, charcoal, wood, marble, granite, talc, and mountain potatoes and apples that are unexcelled in appearance, flavor, and as keepers.

From these two sections solicitors, with their diversified products, come to the mines and towns along the "Mother Lode" which provide a ready market.

Amador ought to be a county of magnificent homes. Nowhere can more beautiful and inspiring landscapes, nor balmier skies, nor purer water, not a more equable climate to be found. Every kind of the best building material is right on the ground. The best of architects and builders are available.

Our schools, as good as the best of the kind, capably supervised, are of the primary and the grammar grades. There is, also, one union high school.

Manufacturing and kindred pursuits are making encouraging headway. We are watching, with great interest, the progress being made by the fire brick plant at Ione. The potteries near Carbondale are placing their products upon the market. The breweries of Jackson and Sutter Creek hold their own in the open market. The several wineries do a thriving business. Two ice plants are taxed to their utmost capacity. The Amador County Steam Laundry provides employment for a great many. The local machine shops and foundry recognize no superior. The door and sash factory at Sutter Creek supplies the local demand in its line. All kinds of stone dressing is most capably and artistically done.

Mountain lakes and valleys and river canyons furnish abundant opportunity for those needing recreation, or for those that enjoy hunting and fishing.

Mineral springs having medicinal properties, that are prescribed in certain cases, are found in different parts of the county.

It seems that nature could not have done more in the preparation of an inland county—even the seashore is becoming more and more accessible by the shortening of distance through rapid transportation. From the main quartz zone of the county San Francisco may now be reached in eight hours. In time this distance will be covered in five hours. Then San Franciscans will come in greater numbers to enjoy with us this land of sunshine, fruits, and flowers, of mineral wealth and countless opportunities for profitable and safe investment.

STATISTICS OF AMADOR COUNTY, 1908-9.

General Statistics.

Area 568 square miles.	
Number of farms	852
Number of acres assessed	270,924
Value of country real estate	$2,776,397
Of improvements thereon	$918,853
Of city and town lots	$285,364
Of improvements thereon	$750,480
Of personal property	$487,235
Southern Pacific Railroad	$184,472
Total value of all property	$5,402,783
Expended on roads last fiscal year	$20,000
Expended for bridges, last fiscal year	$6,000
Number of miles of public roads	615
Road levy per $100, 1909	33c
Value of county buildings	$50,000
Irrigating ditches, miles, 152; cost	$102,750
Railroads, steam—miles, 20; assessed value	$2,628,212
Electric power plants—2; assessed value	$223,500
Electric power lines—miles, 52; assessed value	$30,000
Number of acres irrigated	6,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	4,000	1,500	$60,000
Barley	4,250	900	31,500
Oats	2,240	600	18,000
Corn	320	640	25,600
Total cereals.	10,810	3,640	$135,100
Alfalfa hay	1,200	6,150	$92,250
Grain hay	4,200	9,040	132,720
Grass hay	1,200	1,200	13,200
Total hay	6,600	16,390	$238,170

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	11,350	1,300	12,650
Apricot	2,915	112	3,027
Cherry	2,959	120	3,079
Fig	2,835	60	2,895
Lemon	65	10	75
Nectarine	1,052	10	1,062
Olive	2,250	90	2,340
Orange	1,200	185	1,385
Peach	13,400	1,200	14,600
Pear	10,840	645	11,485
Plum	10,650	120	10,770
Prune	14,100	650	14,750
Quince	740	15	755
Other kinds	125	.....	125
Total fruit trees.	74,481	4,517	78,998
Almond	5,565	780	6,345
Chestnut	2,125	10	2,135
Pecan	25	.....	25
Walnut	1,260	200	1,460
Other nuts	10	.....	10
Total nut trees.	8,985	990	9,975
Grapevines	371,560	36,000	407,560
Berries, acres	40	.....	40

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	1	.....	.....
Skimming stations.	2	.....	$7,600
Butter, pounds		160,000	51,200
Cheese, pounds		20,000	3,500

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	429,540	$8,590
Apricots	406,000	8,120
Blackberries	6,000	500
Beans	14,000	560
Beets	13,000	260
Cabbage	22,000	440
Cauliflower	2,000	200
Corn	180,000	3,600
Currants	400	40
Celery	3,500	350
Cherries	42,000	2,100
Figs	25,000	1,250
Gooseberries	200	20
Grapes	7,880,000	81,400
Loganberries	600	60
Nectarines	25,500	1,300
Onions	120,000	2,400
Oranges, boxes	50	150
Olives	26,000	1,600
Pears	390,700	8,000
Peaches	421,000	8,670
Peas	8,000	400
Persimmons	500	25
Plums	73,000	1,500
Irish potatoes	875,000	15,200
Sweet potatoes	1,000	20
Prunes	320,000	6,000
Quinces	19,000	410
Raspberries	750	190
Strawberries	4,000	600
Tomatoes	36,000	1,000
Totals	11,344,740	$154,955

Dried—	*Pounds.*	*Value.*
Almonds	4,000	$500
Apples	15,000	1,600
Beans	1,500	45
Chestnuts	12,500	1,525
Currants	1,500	150
Figs	1,000	60
Grapes	400	40
Nectarines	2,000	200
Onions	112,000	2,250
Pears	32,000	2,750
Peaches	27,000	2,200
Plums	36,000	3,200
Prunes	127,500	7,700
Raisins	1,200	95
Walnuts	12,500	1,500
Totals	386,100	$23,835

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	250	$5,000
Stock	11,000	132,000
Dairy cows—Graded	2,300	4,600
Thoroughbred—		
Shorthorn bulls	8	160
Calves	1,200	6,000
Swine	1,400	5,600
Horses—		
Thoroughbred	6	4,000
Standard-bred	6	2,000
Common	2,200	9,900
Colts	250	6,250
Jacks and jennies	5	250
Mules	180	8,800
Sheep	2,000	4,000
Lambs	100	100
Common goats	700	1,400
Total stock all kinds.	21,605	$190,060
Wool, pounds	20,000	$2,400
Mohair, pounds	100	20

STATISTICS OF AMADOR COUNTY, 1908-9—Continued.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	175,000	$4,375
Sweet wines	2,500	1,000
Beer, barrels	5,400	43,200
Brandy	750	1,500
Cider	150	50
Vinegar	4,000	1,000

Number of wineries, 5; distilleries, 2; breweries, 2.

Poultry and Eggs.

	Dozen.	Value.
Chickens	3,600	$15,500
Ducks	40	240
Geese	20	240
Turkeys	100	2,500
Eggs	60,000	15,000
Total value		$33,480

Forest Products.

	Amount.	Value.
Area of timber lands, acres	70,400	.....
Cedar, acres	400	.....
Pine, acres	70,000	.....
Sawmills, number	3	.....
Charcoal, sacks	10,000	.....
Fuel, wood, cords	10,000	$56,000
Lumber, feet	320,000	65,000
Piles	130,000	107,500
Posts, pieces	10,000	1,500
Sash and door factories, number	1	1,500
Shakes, thousand	50	300
Shingles, thousand	25	200
Lagging, etc.	167,000	11,775
Round logs	55,000	110,000
Total value		$353,775

Miscellaneous Products.

	Pounds.	Value.
Bees, hives	.....	$900
Sorghum—cane	730,000	1,825
Tobacco	500	50
Gold ore crushed	800,000	3,900,000

Manufactories.

	No.	No. of Empl's.	Value of Product.
Brick	1	25	.....
Carriages and wagons	2	8	.....
Clay	..	25	$125,000
Cigars	1	2	500
Coal	3	20	100,000
Electrical supplies.	1	2	5,000
Flouring mills	1	5	12,000
Foundries and iron works	2	25	65,000
Ice	3	10	7,500
Lime	1	20	10,000
Malt	2	10	23,000
Meat products	6	18	
Hides	..	.....	12,863
Lard	..	.....	3,640
Gold mines	16	2,700	.....

Manufactured Output.

	Quantity.
Clay, tons	35,000
Coal, tons	16,000
Flour, barrels	2,000
Lime, barrels	10,000
Malt, tons	375
Hides, pounds	8,250
Lard, pounds	23,000
Tallow, barrels	100
Olive oil, gallons	150

BUTTE COUNTY.

Butte County has an area of 1,777 square miles, consisting of three sections—mountain, foothill, and plain. It is situated north of the center of the State, about 500 miles from Los Angeles and 150 miles north from San Francisco, yet it is warmer in winter than Florida. There is an abundance of rain, the average being about twenty-five inches each season. The supply of water for power and irrigation purposes is unlimited.

Butte County has two rivers—the Sacramento and the Feather—as well as a number of creeks, the most prominent being Butte Creek, Honcut, Chico, Rock, and Pine creeks. The Sacramento River heads at Mount Shasta in the north and takes its course directly southward, and forms the western boundary of Butte County. It is navigable 100 miles north from Butte County and south its entire length to the San Francisco Bay. Along its Butte County banks are some highly diversified and profitable farms, the products from which are mainly shipped to the markets by river steamers.

The second river in size, but perhaps the first in commercial value to Butte County, is the Feather. It drains an area of 4,000 square miles; in the higher altitudes it supplies water for a large area of grazing land; in its descent toward the valley the water is taken from the river for irrigation purposes. After the valley has been reached it is again tapped by the Butte County Canal Company's ditch, and the Feather River Canal Company is now preparing to take out a large ditch about three miles below Oroville, which will be capable of irrigating 200,000 acres of the Sacramento Valley land, upon which will be produced alfalfa, stock, berries, sugar beets, poultry, vegetables, and every deciduous and citrus fruit known to California.

The opportunity for profitable investment in Butte County has been realized and is being realized by the large vested interests. Capital is now pouring into the county and the magnitude of the investments show that men of large business affairs have unbounded confidence in the future of the county and the opportunities which it presents for remunerative investment.

Some of the larger concerns now found in this field are as follows:

The Sacramento Valley Beet Sugar Company. Plant located twelve miles from Chico. Investment, $1,800,000. Sugar beets grown on the Butte County lands are shipped to this factory over the Northern Electric Railway.

Diamond Match Company. Pacific coast plant located in Butte County. Investment in this plant, $3,000,000.

Irrigation systems already constructed represent an investment of $1,326,000. These cover an area of about 20,000 acres up to the present time. The Feather River Canal will cover about 200,000 acres when completed.

Fruit canneries, fruit drying yards, olive mills, and orange packing houses represent a total investment of $1,000,000.

These facts serve to show that men of large capital see opportunities

in Butte County for the investment of large amounts of money. New companies are constantly coming into the county, realizing it is a field of safe and sound investment.

Gold dredging companies, located at the Oroville gold dredging field. Investment in lands and machinery, $20,000,000.

The principal cities are: Chico, population, 12,000; Oroville, the county seat, population, 6,000; Gridley, 1,500; Biggs, 1,200.

Butte County slopes from the Sacramento River on the west to the summit of the Sierra Nevada Mountains on the north and east, from an elevation of forty feet at the river, across 25 miles of river bottoms to the foothills; thence up the south and west slope of the mountains to an elevation of 7,500 feet, embracing most wonderful and varied climatic conditions and resources.

The north fork and the west branch of the North Fork of Feather River enters Butte County from the north; the Middle Fork enters from the northeast and the South Fork from the east, all uniting and forming Feather River; thence flows south through eight miles of foothills to the Sacramento Valley, and thence south through the Sacramento Valley about twenty miles to the county line.

This great water shed is destined to furnish a marvelous amount of power. At this time the Great Western Power Company, located 20 miles northeast of Oroville on the North Fork of the Feather River, is in operation. This plant, when developed to its fullest capacity, will be second to none in the United States (Niagara excepted). Other large companies have valuable water rights along the Feather River and its tributaries, and the possibilities for further development of power seem almost unlimited.

The Western Pacific Railroad enters this county via the North Fork of the Feather River, and enters the Sacramento Valley at Oroville, where it unites with the Northern Electric and Southern Pacific railroads.

The Southern Pacific's main line extends the entire length of the county, with branch lines from Marysville to Oroville and from Chico to Stirling City.

The Northern Electric extends from Sacramento to Chico, touching at Oroville, and a branch line running to Hamilton.

Power, transportation, water, and raw material in abundance, together with finest climatic conditions and wonderful fertility of soil, seem to indicate beyond all doubt remarkable agricultural and manufacturing development in the near future.

One quartz mine in this county yielded $500,000 during the month of May of this year, and has produced at the rate of $1,000 per day since that time.

There are forty gold dredges in the county, in connection with which are six machine repair shops, employing in all about four hundred men.

Several large drift mines are being opened up, and all indications are that they will become big producers.

There are great deposits of lime, granite, marble, and kaline in the mountainous regions along and near the line of the Western Pacific.

There is immediate prospects of a large cement plant being established.

STATISTICS OF BUTTE COUNTY, 1908-9.

General Statistics.

Area 1,727 square miles, or 1,105,280 acres.	
Number of farms	2,104
Number of acres assessed	900,511
Value of country real estate	$9,830,705
Of improvements thereon	$2,264,350
Of city and town lots	$1,159,665
Of improvements thereon	$1,963,570
Of personal property	$3,789,620
Total value of all property	$19,007,910
Expended on roads last fiscal year	$88,258
Expended for bridges last fiscal year	$71,958
Number of miles of public roads	1,650
Road levy per $100, 1909	40c
Value of county buildings	$250,000
Irrigating ditches—miles, 442; cost	$1,326,325
Railroads, steam—miles, 138; assessed value	$1,998,518
Railroads, electric—miles, 51; assessed value	$273,619
Electric power plants—4; assessed value	$1,352,287
Electric power lines—miles, 256; assessed value	$83,770
Number of acres irrigated	17,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	45,457	22,782	$797,370
Barley	43,902	27,255	817,650
Oats	1,252	812	32,840
Corn	1,165	513	15,390
Total cereals	91,776	51,332	$1,663,250
Alfalfa hay	10,808	50,945	$407,870
Grain hay	70,609	64,210	634,210
Grass hay	779	1,386	7,316
Total hay	82,196	116,541	$1,049,396

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	37,994	15,218	53,212
Apricot	10,394	560	10,954
Cherry	6,337	2,558	8,895
Fig	12,216	550	12,766
Lemon	7,400	280	7,680
Nectarine	1,188	36	1,224
Olive	90,900	8,250	99,150
Orange	169,061	29,095	198,156
Peach	334,075	62,333	396,408
Pear	19,874	4,488	24,362
Plum	11,406	2,740	14,146
Prune	132,131	37,831	169,962
Quince	692	21	713
Other kinds	6,000	.....	6,000
Total fruit	839,668	163,960	1,003,628
Almond	99,578	19,040	118,618
Chestnut	557	55	612
Pecan	118	65	183
Walnut	5,002	2,055	7,057
Other nuts	150	125	275
Total nut	105,405	21,340	126,745
Grapevines	427,145	190,000	617,145
Berries, acres	209	40	249

Wines, Brandies, Etc.

	Gallons.	*Value.*
Sweet wines	6,750	$2,700
Vinegar	51,000	7,650

Number of wineries, 4.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	974,895	$13,623
Apricots	80,010	1,200
Asparagus	21,830	1,319
Blackberries	130,780	6,540
Beans	115,725	4,630
Beets	37,420	375
Cabbage	554,095	8,320
Celery	32,355	970
Cauliflower	20,235	1,015
Corn	323,230	2,500
Currants	2,000	160
Cherries	239,690	11,985
Figs	26,000	4,000
Gooseberries	1,000	80
Grapes	921,000	10,000
Grape fruit	545	1,800
Lemons, boxes	1,395	3,480
Loganberries	75,000	3,800
Nectarines	99,000	900
Onions	15,000	750
Oranges, boxes	143,753	287,500
Olives	6,133,900	132,500
Pears	885,670	12,850
Peaches	10,528,400	94,560
Peas	58,365	2,920
Persimmons	12,130	750
Plums	2,482,860	27,240
Irish potatoes	1,859,230	18,590
Sweet potatoes	136,325	2,450
Prunes	141,115	1,415
Quinces	11,625	235
Raspberries	7,485	940
Strawberries	67,440	5,060
Tomatoes	590,000	5,900
Totals	26,729,520	$670,607

Dried—	*Pounds.*	*Value.*
Almonds	845,000	$101,410
Apples	5,000	500
Apricots	15,000	1,200
Beans	43,000	1,850
Chestnuts	2,400	240
Figs	580,240	14,500
Onions	213,800	3,210
Pears	76,760	4,590
Peaches	3,673,180	156,110
Peanuts	2,000	100
Plums	123,000	4,920
Prunes	8,004,730	241,240
Raisins	61,350	3,680
Walnuts	61,650	6,160
Totals	13,707,110	$539,710

Canned—	*Cases.*	*Value.*
Pears	350	$885
Peaches	35,000	88,000
Totals	35,350	$88,885

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	17,920	$89,600
Ducks	144	865
Geese	63	755
Turkeys	1,700	42,500
Eggs	930,120	232,950
Totals	949,947	$366,670

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries, gals.	2	275,000	$80,000
Skimming stations	22	.....	75,000
Butter, pounds		125,000	30,500

STATISTICS OF BUTTE COUNTY, 1908-9—Continued.

Fish Industry.

	Pounds.	Value.
Salmon	150,000	$7,500

Live Stock Industry.

	Number.	Value.
Cattle—Beef	15,260	$457,800
Stock	16,645	321,320
Dairy cows—Graded	3,350	143,080
Calves	5,580	55,080
Swine	14,815	74,075
Horses—		
Thoroughbred	31	19,500
Standard-bred	875	131,850
Common	4,730	323,750
Colts	1,255	31,775
Jacks and jennies	31	4,300
Mules	2,561	321,125
Sheep	92,625	290,780
Lambs	16,345	40,860
Angora goats	865	3,465
Total stock all kinds	174,968	$2,218,760
Wool, pounds	853,560	$102,900
Mohair, pounds	6,062	875

Forest Products.

	Amount.	Value.
Area of timber lands, acres	350,000	.....
Cedar, acres	35,000	.....
Pine, acres	140,000	.....
Fir, acres	175,000	.....
Sawmills, number	7	.....
Fuel, wood, cords	17,020	$80,390
Laths	1,250,000	5,000
Lumber, feet	55,000,000	1,081,400
Pickets, pieces	500,000	15,000
Posts, pieces	15,000	1,500
Railroad ties, pieces	20,000	10,000
Sash and door factories, number	1	75,000
Shakes	250,000	2,500
Shingles	10,500,000	26,000
Total value		$1,296,790

Power used for mills and manufactories in county—Steam, 18; water, 4; electrical, 12.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 1,400	.....	$2,800
Beeswax	1,000	250
Honey	34,875	2,800
Hops	360,000	72,000
Sugar beets, tons	16,310	84,500
Pumpkins	.....	3,000
Melons	.....	10,000
Rice	175,000	70,000
Total value		$182,350

Manufactories.

	No.	No. of Empl's.	Value of Product.
Wood boxes	50	.....	$1,250,000
Brick	1	8	8,000
Cigars	2	4	7,600
Confectionery	2	6	7,000
Flouring mills	2	20	315,000
Foundries and iron works	1	50	190,000
Matches	1	40	150,000
Meat products	22	128	
Hides		.....	49,000
Lard		.....	19,000
Meat packed		.....	15,000
Tallow		.....	4,500
Olive oil	3	422	140,000
Pickled olives		.....	44,650
Planing mills	2	75	425,000
Granite and marble	1	7	25,000
Total value			$2,649,750

Manufactured Output.

	Quantity.
Brick	1,000,000
Cigars	175,000
Flour, barrels	26,900
Hides, green, pounds	635,880
Lard, pounds	115,000
Meat packed, pounds	500,000
Tallow, barrels	2,200
Pickled olives, gallons	72,500
Olive oil, gallons	52,500

CALAVERAS COUNTY.

On the western slope of the Sierra Nevada Mountains, nestled among its foothills and extending into the great valley of the San Joaquin, is the county of Calaveras. Its situation midway between the north and south boundaries renders it among the desirable locations of the State. It has an area of over 1,000 square miles, being about equal in size to the state of Rhode Island.

The Mokelumne River on the north divides the county from Amador, while the Stanislaus River separates the county from Tuolumne on the south. The extreme northeast corner joins Alpine. On the west San Joaquin and Stanislaus counties join Calaveras, making Calaveras almost a triangle in shape.

The Calaveras River runs in a westerly direction through the central part of the county. It is from this river that the county gets its name. Some early travelers discovered a great quantity of bones and skulls upon its bank, and gave it the name Calaveras, meaning skulls.

From the peculiar formation and location of the county, the salubrity of the climate is remarkable and widely varied. From May to October the county is without storms. From October to May warm and abundant rains bless the land. The absence of fogs and consequent dryness of the atmosphere gives an invigorating climate.

There are no marshes to breed malaria within the county. The sloping plane of its territory gives excellent drainage to all sections. The soft breezes of the pine region are a balm to those affected with pulmonary complaint. The chilly winds of the coast are here tempered into mildness and give healthful vigor to the inhabitants.

The county is particularly famous for its mines. The "Long Tom" and the "Rocker" are gone forever and are replaced by the quartz mill and other appliances for deep quartz and gravel mining. The county is crossed by the great "Mother Lode," which is here characterized by low, medium, and high grade ore, and in which are mines that have yielded millions. The values are revealed as depth is attained, and along the entire lode are deep lying values, as great as those that have made the Gwin, the Utica, the Lightner, the Angels, the Royal, the Morgan, and a score of others famous. Narrower and richer veins fill the vast region known as the "East Belt," of which the famous Sheep Ranch is an example.

Mining, however, is not confined to gold mining, for across the broad western end of the county, through the low foothills, runs the great copper belt. This belt parallels the "Mother Lode" about twelve miles to the west. It was here that copper mining first began in California, in the early sixties, and until the development of the great copper deposits of Shasta County, Calaveras was always the leading copper producing county of the State. Well equipped plants are in operation extracting and reducing the ore at Copperopolis and Campo Seco.

Deposits of iron exist, lime enough to supply the State, marble of

unknown value and extent, clay for pottery, crystal for lens, asbestos of commercial value, and many kinds of precious stones.

The fortunes in mineral wealth produced by Calaveras County are but a trifle to the untold millions still embraced in its hills.

While not classed as an agricultural county, yet the entire county is dotted with farms. The soil is exceedingly fertile and under a thorough system of cultivation produces immense crops. The products of the farm are hay, grain and potatoes.

As a tree producer Calaveras County can not be excelled. It is adapted to the production of most any fruit. Oranges, olives, apples, grapes, peaches, pears, plums, apricots, and walnuts grow well. The choicest apples are produced in the eastern part of the county; large crops are annually produced and sold at good prices. Not only is the crop a success, but the quality is regarded as greatly superior to those of the valley or coast counties.

Irrigation and power facilities are unlimited. There is a perfect network of ditches throughout the county. The streams are tapped at various points and their waters distributed chiefly for mining and power purposes. The many convenient gulches and canyons afford excellent opportunities for storage reservoirs. Several storage systems are being perfected at the present time.

The timber belt in the eastern part of the county is enormous. Vast forests of sugar pine, yellow pine, spruce, cedar, and oak cover the mountains. Logging is done by improved methods, and the lumber hauled by traction engines. The product of this vast industry is seriously retarded, however, by the limited means of transportation, although considerable quantities are used for local mining purposes. There is every promise of a great revival of this industry in the county in the near future contingent upon the extension of the railroad.

Stock raising is important. Pasturage is abundant on the mountain ranges, and in the summer they are thronged with vast herds of cattle, horses, and sheep, brought from the valleys and lower pastures and driven back again upon the approach of winter.

Few counties, indeed, afford a more varied opportunity for the pleasure seeker or can surpass it in scenery. In many beautiful valleys its green, fertile fields, its clear, winding streams, its snow-capped mountain tops are ever a changing source of delight, but greater and grander than all are its groves of "Big Trees." They are one of the greatest attractions on earth. Their fame has spread to the remote parts of the globe and they are of world-wide interest. It is an ideal trip through the grove. Much has been said and written about them, but an adequate conception can only be secured by a visit. A trip through the county reveals the scenery of the highland type and affords to the lover of scenic beauty a rare feast.

Calaveras County is a field for investors and homeseekers. It has unlimited mineral wealth undeveloped, vast timber resources, water in abundance for irrigation or power purposes, sites for storage systems, choicest fruits, cheap land for farming purposes, soil that will produce immensely under proper conditions, a bank, churches, newspapers, power plants, and schools that rank favorably with any in the State, and towns whose social standing is good. It can easily support double its present population, and its contribution to the wealth of the State would be increased in proportion.

COLUSA COUNTY.

Colusa County is situated in the great Sacramento Valley. It has no tornadoes, cyclones, or blizzards; no extremes of temperature and no epidemics. Its varied soil and climate is such that there is no product of the United States but has been grown successfully within its borders. The inexhaustible supply of water in the Sacramento River, which traverses the entire length of the county, judiciously applied to the soil of marvelous proven capability, will produce results that seem incredible when quantity and variety are considered.

Situated as Colusa County is, with the main line of the Southern Pacific Railroad Company running through the middle of the county from north to south, and the Sacramento River framing the eastern border, the transportation question is solved.

Along that line of railroad is situated the thriving towns of Arbuckle, Williams and Maxwell. That portion of Colusa County confronts an era of prosperity never before thought possible. The completion of Central Canal by Eastern capitalists, who are investing hundreds of thousands of dollars of their own money in these lands, will bring about the colonization of former large land holdings, and the broad plains of Colusa County will blossom as a rose.

Princeton, Colusa, Sycamore, and Grimes are river towns and shipping points. Princeton is now experiencing the benefit of irrigation and small farms. The sale of the celebrated Boggs ranch into small tracts, with the water, is a demonstration of what can and will be done along the canal and the river. Sycamore is a small village, surrounded by land of unequaled fertility. Grimes is a thrifty little town, and the shipping point for a large territory. The products of that section of the county frequently exceed in value any other community.

College City is a school town, located three miles east of Arbuckle, and in the midst of our grape growing section—the Fresno of Colusa County.

Colusa, the county seat, is a town of 3,000 inhabitants, an ideal home town, with wide, well shaded streets. It has a primary, grammar and high public schools, a convent school, besides private schools; churches of all denominations, with imposing church buildings, and well paid ministers to officiate at each. Recently, the trustees of Colusa called an election to vote to bond the town for $100,000 for a sewer system and municipal water system. The bonds carried by an overwhelming majority, and the largest premium for the privilege of holding these bonds was offered by a local bank. The county in the near future will vote on bonds for good roads. With good roads, irrigation and small holdings, the outcome of Colusa County will be the realization of the fondest dream of our late lamented Will S. Green.

The western portion of Colusa County is principally hilly and mountainous, with some very productive valleys intervening. Live stock interests prevail, and the income is very satisfactory. Mineral springs of more than local fame are attractions of that section.

Fouts Springs are known far and wide for mineral and bath waters, hunting, trout fishing and hospitable entertainment.

The Jones hot sulphur and the Wilbur hot sulphur springs are favorably known wherever rheumatism prevails.

Cooks Springs mineral water is one of the resources of the county. Thousands of gallons are bottled and shipped to every point of note on the Pacific coast. If you have never indulged in a Cooks Mineral Water Lemonade, you have got "somethin' comin'."

Sulphur Creek is a trading point, maintained by live stock, quicksilver and gold mining in a small way. Leesville and Stonyford are trading points situated in grazing districts, where cattle and sheep are the principal source of revenue.

Sites is situated at the terminus of the Colusa and Lake Railroad, and the location of two sandstone quarries made famous by their product withstanding the San Francisco earthquake and fire.

Colusa County, with her life-prolonging mineral waters, wild game, geese, ducks, deer and trout, reinforced by a million pounds of dried prunes and other fruits, one hundred thousand tons of grain, is a little world all her own, and when outsiders realize it, you will be sorry you waited "so long."

STATISTICS OF COLUSA COUNTY, 1908-9.

General Statistics.

Area, 1,080 square miles, or 691,200 acres.	
Number of farms .....a.....	930
Number of acres assessed.....	599,765
Value of country real estate...	$8,863,425
Of improvements thereon.....	$595,135
Of city and town lots.....	$352,020
Of improvements thereon.....	$680,305
Of personal property.....	$1,506,714
Total value of all property.....$12,992,538	
Expended on roads, last fiscal year	$32,274
Expended for bridges, last fiscal year	$25,125
Number of miles of public roads	1,255
Road levy per $100, 1909.....	40c
Value of county buildings.....	$100,000
Irrigating ditches—miles, 19; cost	$3,800
Railroads, steam—miles, 56; assessed value	$828,106
Electric power plants and lines—1; miles, 16; assessed value	$9,580
Number of acres irrigated.....	2,120

Cereal Products and Hay.

Tons of 2,000 pounds.

	Tons.	*Value.*
Wheat	5,605	$168,150
Barley	49,625	1,240,625
Oats	453	12,488
Corn	5,115	143,220
Total cereals	60,798	$1,564,483
Alfalfa hay	7,220	$72,200
Grain hay	40,788	489,456
Total hay	48,008	$561,656

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	1	.....	$4,500
Butter, pounds		404,103	141,436

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	7,920	130	8,050
Apricot	18,870	400	19,270
Cherry	1,350	120	1,470
Fig	4,140	2,000	6,140
Lemon	850	100	950
Nectarine	40	20	60
Olive	6,525	150	6,675
Orange	8,250	1,150	9,400
Peach	10,990	240	11,140
Pear	3,775	.....	3,775
Prune	84,100	1,850	85,950
Quince	120	20	140
Other kinds	145	.....	145
Total fruit trees.	146,985	6,180	153,165
Almond	23,620	6,100	29,720
Walnut	3,650	700	4,350
Total nut trees..	27,270	6,800	34,070
Grapevines	690,800	265,600	956,400
Berries, acres	60	20	80

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,245	$37,350
Stock	14,630	219,450
Dairy cows—Graded	2,330	81,500
Calves	4,873	48,730
Swine	18,444	147,540
Horses—		
Thoroughbred	7	1,750
Common	3,120	187,200
Colts	1,025	20,500
Jacks and jennies.....	42	5,250
Mules	4,110	513,750
Sheep	75,000	300,000
Lambs	50,000	125,000
Angora goats	3,300	13,200
Total stock all kinds..	178,126	$1,701,220
Wool, pounds	800,000	$152,000
Mohair, pounds	13,200	2,640

STATISTICS OF COLUSA COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

	Production.	
Green—	*Pounds.*	*Value.*
Apricots	40,000	$2,000
Asparagus	42,000	2,100
Blackberries	3,000	150
Beans	3,500	80
Beets	4,900	85
Cabbage	54,000	810
Celery	26,000	520
Cauliflower	16,000	240
Corn	30,000	450
Figs	30,000	300
Grapes	200,000	2,000
Grapes, wine	180,000	720
Lemons, boxes	200	500
Loganberries	3,500	280
Onions	30,000	600
Oranges, boxes	4,150	10,375
Olives	25,000	.....
Pears	5,300	660
Peaches	9,000	180
Peas	22,000	220
Irish potatoes	780,000	15,600
Sweet potatoes	30,000	600
Tomatoes	850,000	850
Totals	2,387,650	$39,320
Dried—	*Pounds.*	*Value.*
Almonds	51,000	$5,610
Apricots	33,750	3,375
Beans	1,542,840	50,913
Figs	30,230	906
Onions	180,330	2,704
Pears	6,000	360
Peaches	24,880	870
Plums	18,000	900
Prunes	2,600,000	78,000
Raisins	900,000	22,500
Walnuts	10,340	1,292
Totals	5,407,370	$167,430

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Flouring mill	1	6	$105,280
Planing mills	2	12	60,000
Sandstone	2	20	80,845
Quicksilver, 20 flasks		.....	880
Gold		.....	1,000

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	2,425	$12,125
Ducks	31	186
Geese	10	80
Turkeys	1,240	24,800
Eggs	120,122	30,040
Total value		$67,231

Forest Products.

	Amount.	*Value.*
Sawmills, number	1	$3,000
Fuel, wood, cords	1,000	7,500
Lumber, feet	500,000	15,000
Total value		$25,500

Power used for mills and manufactories in county—Steam, 2; 1 flour mill, 1 sawmill.

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 750	.....	$1,500
Broomcorn	264,000	19,800
Honey	18,000	1,800
Alfalfa seed	42,000	7,560
Flax seed	6,568	147
Dressed poultry	284,375	.....
Wild game	84,630	.....

Wines, Brandies, Etc.

	Gallons.	*Value.*
Cooks Springs mineral water	183,180	$77,103

Fish Industry.

	Pounds.	*Value.*
Bass	12,200	$1,220

Manufactured Output.

	Quantity.
Flour, barrels	14,400
Hides, pounds	89,490
Lard, pounds	65,340
Tallow, pounds	59,660

CONTRA COSTA COUNTY.

Contra Costa is one of the central counties, its shore line being within 14 miles of San Francisco. It possesses unusually good traveling facilities, both by rail and by steamer. The county has 70 miles of water front, nearly all of which is upon deep water, navigable by all vessels engaged in commerce. Over three fourths of its area is cultivated, the balance being used for grazing. The only mountain of any size is Mount Diablo, which is 3,896 feet in height and almost in the geographical center of the county.

About two thirds of the area is rolling and hilly. Lying between the hills are some of the most fertile and beautiful valleys in the State, which are drained and watered by many streams, the banks of which are bordered by oak, sycamore, laurel, willow, etc., while the hills are dotted with oaks, many of which are of large size.

The farming lands in the eastern section are between the foothills and the San Joaquin River. The soil is of a rich alluvial nature, and produces wheat, barley, alfalfa, fruit, and vines. To the northward and between the uplands and the San Joaquin River is a body of tule lands, a large portion of which has been reclaimed, and is some of the most productive land in the State, being a rich deposit of sediment and decomposed vegetation. Alfalfa, asparagus, potatoes, beans, etc., are produced on the largest scale on such lands, the asparagus being shipped East by the car load during the early spring.

The average rainfall is from eighteen to twenty-three inches, which is ample for all purposes of agriculture, horticulture, etc.

In depth, the soil throughout the county shows a remarkable continuity of rich alluvial deposits underlaid by limestone or clay. There is an occasional change to a coarse sandy and gravelly heavy loam of black or brown tint. It has great power for enduring drought, and is easy to work, giving large returns. The soil in the uplands is in character similar to that of the lowlands, and being drier, is for some purposes even better.

Irrigation is not required to insure crops; the abundant rainfall, the absence of evaporating heat, and the moisture-laden breezes from the ocean furnish abundant humidity for all forms of vegetable life without recourse to artificial irrigation.

The many beautiful valleys and the rolling hills are strikingly similar in general characteristics to the gentle slopes of sunny France. Scattered in all directions are numerous small vineyards and orchards that produce rich results. Fruit growing has proved successful and remunerative.

Grain raising is very prominent in this county. A very large acreage is planted to wheat, oats, barley, and hay.

The raising of sugar beets is a growing industry.

Vegetables of all kinds are raised very profitably and on a large scale; one very large tract of land is used entirely for the propagation of

asparagus for early Eastern shipment. Potatoes, beans, etc., are a prolific and profitable crop, especially in the central portion.

Natural feed is abundant, both on the hillsides and at a higher elevation.

Stock raising is a leading industry, as the reclaimed lowlands for summer grazing and the rolling hills for winter, close together, create conditions whereby a failure is impossible. The stock farms have produced some of the most famous trotting and pacing horses. In addition to the raising of horses, much attention is given to blooded cattle, sheep, and hogs.

Large dairies are conducted, and in the western end the product mostly shipped to the cities is milk, while in the central and eastern parts butter is the main object. Low freight and express rates give unusual advantages.

Contra Costa County is well adapted to poultry raising. Feed can be obtained cheaper than in other sections where the industry is thriving. The central part of the county is only a few hours' drive from Oakland and suburbs. The demand for eggs is always greater than the supply.

The only important mining industry is the coal mines of Mount Diablo, although some little mining for precious metal has been done.

The terminus of the Santa Fe railroad is located at Point Richmond, and many substantial improvements in the way of wharves, etc., on a very extensive plan, have been constructed.

Port Costa, the shipping point for the bulk of the grain raised in California, has extensive warehouses.

At Pinole are located large stockyards; near Vallejo Junction is the largest smelting works in the State; at Vallona are extensive lumber yards, where ships from Oregon and Puget Sound discharge. At Crockett are flouring mills; also agricultural works.

STATISTICS OF CONTRA COSTA COUNTY, 1908-9.

General Statistics.

Area, 877 square miles, or 561,267 acres.	
Number of acres assessed	492,478
Value of country real estate	$11,781,070
Of improvements thereon	$5,083,550
Of city and town lots	$3,612,900
Of improvements thereon	$2,076,555
Of personal property	$5,922,870
Total value of all property	$32,472,408
Expended on roads, last fiscal year	$83,769
Expended for bridges, last fiscal year	$6,701
Road levy per $100, 1909	40c
Value of county buildings	$415,000
Railroads, steam — miles, 163.54; assessed value	$3,223,177
Railroads, electric — assessed value	$127,618
Electric power lines—miles, 59; assessed value	$107,820

Dairy Industry.

	Number.	*Value.*
Creameries	2	$42,850
Skimming stations	35	40,000
Butter	..	65,000
Cheese	..	1,700

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	20,000	4,200	24,200
Apricot	40,000	5,000	45,000
Cherry	20,000	10,000	30,000
Fig	4,000	575	4,575
Lemon	750	250	1,000
Nectarine	1,000	250	1,250
Olive	10,050	3,950	14,000
Orange	3,000	500	3,500
Peach	60,000	7,500	67,500
Pear	115,000	8,500	123,500
Plum	20,000	1,500	21,500
Prune	77,000	10,000	87,000
Quince	3,000	200	3,200
Total fruit..	373,800	52,425	426,225
Almond	280,000	10,000	290,000
Chestnut	500	.....	500
Pecan	500	.....	500
Walnut	25,000	10,000	35,000
Total nut ..	306,000	20,000	326,000
Grapevines	3,236,800	455,000	3,691,000
Berries, acres.	500	.....	500

STATISTICS OF CONTRA COSTA COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	12,000	15,000	$600,000
Barley	45,000	60,000	1,500,000
Oats	14,000	15,000	375,000
Corn	1,000	1,000	30,000
Total cereals	72,000	91,000	$2,505,000
Alfalfa hay	2,000	12,000	$120,000
Grain hay	100,000	200,000	3,000,000
Grass hay	10,000	20,000	210,000
Total hay	112,000	232,000	$3,330,000

Fruits, Vegetables, Etc.

	Total Production. Pounds.	Value.
Green—		
Apples	150,000	$4,500
Apricots	840,000	16,800
Asparagus	10,000,000	200,000
Blackberries	60,000	3,000
Beets	1,200,000	3,000
Celery	1,000,000	100,000
Corn	200,000	30,000
Cherries	2,000,000	50,000
Figs	11,000	1,000
Gooseberries	2,000	160
Grapes, table	2,400,000	60,000
Lemons, boxes	1,000	1,500
Loganberries	10,000	400
Onions	1,000,000	20,000
Oranges, boxes	1,100	1,650
Olives	500,000	10,000
Pears	1,500,000	30,000
Peaches	2,000,000	40,000
Plums	20,000	300
Irish potatoes	100,000,000	900,000
Prunes	1,250,000	25,000
Quinces	20,000	400
Raspberries	4,000	360
Strawberries	10,000	600
Tomatoes	750,000	7,500
Totals	125,129,100	$1,407,170
Dried—	Pounds.	Value.
Almonds	1,080,000	$118,800
Apricots	200,000	14,000
Beans	400,000	32,000
Pears	200,000	12,000
Peaches	100,000	8,000
Prunes	1,000,000	30,000
Walnuts	150,000	16,500

Poultry and Eggs.

	Dozen.	Value.
Chickens	25,000	$120,000
Ducks	900	5,400
Geese	1,100	16,000
Turkeys	600	12,000
Eggs	875,000	237,500
Total value		$390,900

Live Stock Industry.

	Number.	Value.
Cattle—Beef	8,000	$200,000
Stock	9,150	150,000
Dairy cows—Graded	10,000	300,000
Calves	8,000	40,000
Swine	10,000	50,000
Horses—		
Thoroughbred	75	30,000
Standard-bred	175	24,500
Common	6,400	320,000
Colts	2,000	40,000
Jacks and jennies	20	3,000
Mules	2,000	110,000
Sheep	20,000	50,000
Lambs	7,000	10,500
Common goats	200	400
Total stock all kinds	83,020	$1,328,400

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines, sweet wines and champagne	5,000,000	$900,000
Beer, barrels	12,000	84,000
Cider	50,000	5,750
Vinegar	20,000	4,200

Number of wineries, 65; distilleries, 6; breweries, 3.

Fish Industry.

	Pounds.	Value.
Salmon	2,000,000	$60,000

Forest Products.

	Amount.	Value.
Redwood, acres	1,200	.....
Fuel, wood, cords	16,000	$96,000

Manufactories.

	No.	No. of Empl's.	Value of Product.
Wood boxes	1	250	$780,000
Brick	7	450	2,400,000
Cement	1	200	1,500,000
Cigars	4	20	13,400
Confectionery	3	10	10,000
Flouring mills	2	20	200,000
Foundries and iron works	1	15	.....
Furniture	2	50	.....
Lime	3	500	1,000,000
Matches	1	50	50,000
Paper	1	125	500,000
Pickled olives	..	.....	7,500
Planing mills	2	500	.....
Potteries	1	20	.....
Artificial stone	1	.....	.....
Oil refineries	3	3,200	.....
Sugar refinery	1	400	.....
Smelters and acid works	..	915	.....
Rubber works	1	95	.....
Powder works	3	750	3,080,000

DEL NORTE COUNTY.

Del Norte is the extreme northwestern county of California and has a coast line of about 35 miles. Crescent City, the county seat and principal harbor, is 280 miles from San Francisco.

Smith and Klamath are the principal streams, the former in the northern and the latter in the southern part of the county. Both are navigable near their mouths to small ocean going steamers. Dairying and lumbering are the principal industries. The mountains of the county prospect well in copper and gold-bearing formations.

STATISTICS OF DEL NORTE COUNTY, 1908-9.

General Statistics.

Area, 1,546 square miles, or 989,000 acres.	
Number of farms	152
Number of acres assessed	220,896
Value of country real estate	$3,334,377
Of improvements thereon	$95,060
Of city and town lots	$80,760
Of improvements thereon	$138,910
Of personal property	$291,767
Total value of all property	$3,956,785
Expended on roads, last fiscal year	$11,519.38
Expended for bridges, last fiscal year	3,000
Number of miles of public roads	135
Road levy per $100, 1909	40c
Value of county buildings	$21,500
Railroads, steam, miles	22
Electric power plants—1; assessed value	1,500

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	100	150	$5,000
Barley	300	450	11,125
Oats	1,500	1,125	22,500
Total cereals			$38,625
Grain hay	1,500	1,500	$27,000
Grass hay	1,500	1,500	30,000
Total hay			$57,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	4,500	1,000	5,500
Cherry	250	.....	250
Peach	350	.....	350
Pear	500	.....	500
Prune	350	.....	350
Other kinds	500	.....	500
Total fruit trees	6,450	1,000	7,450
Grapevines, acres.	5		
Berries, acres	25		

Fruits, Vegetables, Etc.

Green—	*Production. Pounds.*	*Value.*
Apples	250,000	$5,000
Sweet potatoes	800,000	10,000
Strawberries	6,000	1,200
Totals	1,056,000	$16,200

Fish Industry.

	Pounds.	*Value.*
Salmon, 5,500 cases	264,000	$33,000
Other kinds, 350 barrels.	30,000	5,000
5,000 crabs, $2 per dozen.	.....	832
Total		$38,830

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	9	.....	.....
Skimming station.	1	.....	.....
Butter, pounds		1,000,000	$270,000

Live Stock Industry.

	Number.	*Value.*
Cattle	500	$15,000
Stock	2,000	30,000
Dairy cows—Graded	4,000	120,000
Swine	2,500	12,500
Horses—		
Thoroughbred	5	1,000
Standard-bred	10	2,000
Common	350	17,850
Colts	150	3,750
Mules	10	1,000
Sheep	1,500	4,500
Lambs	500	1,000
Angora goats	200	1,000
Common goats	150	350
Total stock all kinds	11,575	$209,950
Wool and mohair, lbs.	20,000	.....

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	500	$2,500
Ducks	20	80
Turkeys	40	720

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	146,000	.....
Pine, acres	46,000	.....
Redwood, acres	100,000	.....
Sawmills, number	2	.....
Lumber, feet	35,000,000	.....
Posts, pieces	40,000	$400
Shingles	25,000,000	.....

Power used for mills and manufactories in county—Steam, 13; electrical, 1.

Manufactories.

Cigar factories, 1, employees, 2; clothing, 1, employees, 3; cooper shops, 1, employees, 1.

EL DORADO COUNTY.

El Dorado, the "Old Empire County," is situated about the middle of the eastern tier of counties. It is a county of hills and valleys. There are no great tracts of prairie land. The soil is as good as the best, and so far as tested will produce anything that grows anywhere else. No county under the sun has any greater possibilities than this county, and having once made history by the fact of gold being discovered here by Marshall, we are on the morning of a second awakening. It is true that there are no large farms here where you may see in use the combined harvester and thresher, because this is not that kind of a county, but there are many vine clad hills where both table and wine grapes are grown that can not be surpassed, many orchards nestling in the little valleys that abound, where the luscious peach, the pear, the apple, the cherry, the olive, and many other varieties of fruit are grown that are known to the world as the production of El Dorado County, and that stand for good goods.

Irrigation facilities are more than ample, and if you want water it costs you twenty cents an inch. There are lots of ranches that have free water here from living springs and creeks that are on the place. Lots of ranches where free water may be had for the labor of digging ditches, etc.

Land in El Dorado is cheap, much cheaper than it will be in a few years from now for many truthful reasons. Why should an investor pay from $50 to $100 per acre for land that will not raise any better fruits than land which can be bought in this county for $10 and even less in some instances? And again, we are going to have more railroads here that will bring lands in touch with the markets that are now lying dormant. We have one road now that runs through practically the center of the county, one in course of construction that will open up the northern part and one in contemplation that will catch the southern part of this and the northern part of Amador County.

We have the best drinking water in the world here, because it comes from the lofty Sierras where the snow caps kiss the clouds.

We have a good high school duly accredited, and sixty-five public schools scattered over our county. We have plenty of firewood here for the cutting. We have lumber galore. We have an electric power plant developing 6,000 horsepower and more in course of construction, and we have plenty of unharnessed water left. We have gold mines, and we have a slate quarry, the only one in the West which produces as good a quality of slate for all kinds of purposes as any quarry in the world. We have good substantial deposits of limestone, marble, asbestos, and enough granite to rebuild the cities of the world, and within a few miles of the county seat we have all the ingredients that go to make cement.

Last, but not least, we have the beautiful Lake Tahoe within our borders, the lake that is rivaled by none, not even the beautiful Lake Lucerne that has made Switzerland famous to globe trotters; in fact,

our county is justly termed the Switzerland of America. Hunting and fishing are good. Fishing is good because we stock our streams with trout and hunting is good because it always has been so. These are a few of the things we have and only the Lord knows how much more.

STATISTICS OF EL DORADO COUNTY, 1908-9.

General Statistics.

Area, 1,796 square miles, or 1,049,440 acres.	
Number of farms	1,670
Number of acres assessed	663,189
Value of country real estate	$2,795,060
Of improvements thereon	$691,770
Of city and town lots	$239,330
Of improvements thereon	$514,660
Of personal property	$790,184
Total value of all property	$5,031,004
Expended on roads, last fiscal year	$14,870
Expended for bridges, last fiscal year	$6,540
Number of miles of public roads	760
Road levy per $100, 1909	40c
Value of county buildings	$85,000
Irrigating ditches—miles, 160; cost	$270,000
Railroads, steam—miles, 22; assessed value	$824,000
Electric power plants—1; assessed value	$55,980
Electric power lines—miles, 36; assessed value	$14,000
Number of acres irrigated	15,650

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	30	30	$1,350
Barley	60	60	2,400
Oats	50	50	2,000
Total cereals	140	140	$5,750
Grain hay	.....	22,000	$252,000
Grass hay	.....	1,000	12,000
Total hay	.....	23,000	$264,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	5,750	2,300	8,050
Apricot	550	250	800
Cherry	2,500	750	3,250
Fig	1,550	.....	1,550
Nectarine	1,700	.....	1,700
Olive	3,800	500	4,300
Orange	800	.....	800
Peach	120,500	14,200	134,700
Pear	11,500	9,000	20,500
Plum	5,600	.....	5,600
Prune	17,500	.....	17,500
Quince	500	.....	500
Other kinds	13,000	900	13,900
Total fruit	185,250	27,900	213,150
Almond	1,000	.....	1,000
Chestnut	500	.....	500
Walnut	650	1,000	1,650
Other nuts	2,150	1,000	3,150
Grapevines	2,025,000	675,000	2,700,000
Berries, acres	50	10	60

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	300,000	$3,000
Cherries	40,000	2,000
Figs	4,000	160
Pears	1,920,000	28,800
Peaches	1,960,000	25,480
Plums	260,000	5,200
Prunes	260,000	5,200
Totals	4,744,000	$69,840
Dried—	*Pounds.*	*Value.*
Peaches	20,000	$1,000
Prunes	40,000	1,200
Totals	60,000	$2,200

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	12,500	$4,900
Sweet wines	7,000	7,000
Beer, barrels	1,200	12,000
Brandy	6,500	13,000
Cider	500	125
Vinegar	7,000	1,750

Number of wineries, 6; distilleries, 4; breweries, 1.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	3,700	$92,500
Stock	10,000	150,000
Dairy cows—Graded	4,500	85,000
Thoroughbred—		
Herefords	100	3,000
Holsteins	100	3,000
Shorthorns	400	12,000
Calves	3,400	34,000
Swine	1,200	7,500
Horses—		
Thoroughbred	100	20,000
Standard-bred	400	60,000
Common	1,500	75,000
Colts	600	8,500
Jacks and jennies	10	1,000
Mules	300	30,000
Sheep	3,000	9,000
Lambs	1,500	3,000
Angora goats	1,500	3,500
Common goats	2,000	2,000
Total stock all kinds	34,310	$599,000
Wool, pounds	7,000	$1,500
Mohair, pounds	2,000	600

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	1,500	$7,000
Ducks	250	1,300
Geese	100	600
Turkeys	400	4,800
Total value		$13,700

STATISTICS OF EL DORADO COUNTY, 1908-9—Continued.

Dairy Industry.

	Production.	*Value.*
Butter, pounds	200,000	$60,000
Cheese, pounds	12,000	2,500

Forest Products.

	Amount.	*Value.*
Pine, acres	150,000	$3,000,000
Sawmills, number	7	150,000
Charcoal, sacks	2,000	700
Fuel, wood, cords	9,000	19,000
Lumber, feet	20,000,000	300,000
Piles	1,600	10,000
Shakes, thousand	800	5,700
Shingles, thousand	300	600
Total value		$3,486,000

Power used for mills and manufactories in county—Steam, 19; water, 20; electrical, 5.

Miscellaneous Products.

	Value.
Honey	$5,000

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Wood boxes	3	100	$160,000
Carriages and wagons	2	5	10,000
Cigars	4	10	13,500
Foundries and iron works	2	5	13,000
Machinery	1	5	12,500
Meat products—			
Hides	..	....	7,000
Lard	..	....	6,000
Tallow	..	....	4,000
Planing mills	2	10	26,000
Artificial stone	1	5	5,000
Roofing slate	1	30	50,000
Silica	1	3	10,000

Manufactured Output.

	Quantity.
Cigars, thousand	340
Hides, pounds	85,000
Lard, pounds	6,000
Tallow, barrels	350

FRESNO COUNTY.

Of the fifty-eight counties in California, the first twenty-seven were organized on February 18, 1850, and six years later Fresno County was organized, on April 19, 1856. It is situated in the exact center of the State, and in the middle of the fertile San Joaquin Valley.

There are only four counties which exceed Fresno in size, San Bernardino, Inyo, Kern and Riverside, in the order named. When Fresno was first formed it was considerably larger, but on the 11th day of March, 1893, a large slice, consisting of 2,140 square miles was carved out of the northern part of the county, and formed into Madera County; and still more recently, Fresno County was again mutilated by a little over 117 square miles of the southeast portion being transferred to Kings County by an act of the legislature approved April 12, 1909.

Before being partitioned Fresno County comprised 7,746 square miles, but the land area now amounts to 6,035 square miles, or 3,862,400 acres, and therefore still remains the fifth largest county of the fifty-eight in the State, and one of the most productive.

The assessed value of each incorporated town in the county is as follows:

Fresno	$10,925,946
Coalinga	698,973
Selma	658,952
Fowler	212,238
Kingsburg	154,747
Total	$12,650,656

Among the other towns in the county are Sanger and Clovis, both having large sawmills and lumber depots; Reedley, on the Kings River, near the foothills; Laton, in the center of a large agricultural and dairying district, and Kerman, the latest town in the county.

The word Fresno, in Spanish, signifies ash tree, and it was because of the abundance of mountain ash in the mountains of this county that it received its name.

TOPOGRAPHY AND SOIL.

Fresno County is naturally subdivided into two portions, plains and mountains.

The plains are the bottom of the San Joaquin Valley, extending from the foot of the Coast Range on the west to the foothills of the Sierra Nevadas on the east. The trough of the valley south of Fresno has an elevation of 180 feet. Fresno City has an elevation of 290 feet, and the valley, at the edge of the foothills, has an elevation of about 500 feet. From the first foothills the rise is rapid, the mountains culminating in peaks rising 10,000 to 12,000 feet high.

The country about Fresno is a vast plain intersected by the San Joaquin and Kings rivers and their tributaries.

Four natural soil divisions have been recognized: the foothill region,

where agriculture was formerly confined to grazing; the plains of the valley, with red soils lying near the hills; the "white ash" soil found further out in the plain, and the bottoms, or alluvial lands, along the Kings River.

CLIMATE, RAINFALL, AND FROST.

There is a dry and a wet season; the former from about May to September, and the latter from the middle of October or early part of November. The average rainfall at Fresno is about 10.12 inches annually. The rains, which are at irregular intervals during the winter, seldom last more than two or three days at a time.

There are about 275 days of sunshine in the year. The atmosphere during the summer months is dry, and the heat not nearly so oppressive as in the East, and other places where the humidity is great. Sunstroke is unknown. The highest temperature ever recorded in Fresno was 115° on July 8, 1905, and the lowest in the last ten years was 24° on February 6, 1899, and December 29, 1902.

TEMPERATURE FOR THE PAST TEN YEARS.

Year.	Highest.	Date.	Lowest.	Date.
1899	111	July 19	24	February 6
1900	109	July 12	26	December 31
1901	110	August 3	27	December 18
1902	110	July 23	24	December 29
1903	108	August 8	25	February 14
1904	109	August 7	28	January 20
1905	115	July 8	26	December 24
1906	111	July 24	27	December 24
1907	103	August 16	30	January 21
1908	114	July 31	29	December 16
1909	107	July 13	30	December 6

July and August are the hottest months, and December, as a rule, the coldest.

RAINFALL AND FROST FOR THE CALENDAR YEAR.

Year.	Inches rain.	Last frost in spring.	First frost in fall.
1899	10.54	April 29	December 10
1900	11.09	April 9	October 30
1901	7.35	April 8	December 7
1902	7.91	April 22	November 21
1903	6.19	April 11	November 17
1904	13.33	April 23	December 4
1905	7.27	April 1	December 14
1906	16.06	March 19	December 5
1907	9.00	March 18	November 29
1908	7.08	April 1	December 7
1909	12.17	March 10	November 12

DATE OF FIRST AND LAST RAINS BY SEASONS.

(Amounting to .01 of an inch or more.)

Season of	First rain.	Last rain.
1899-1900	October 11, 1899	May 11, 1900
1900-1901	September 3, 1900	May 25, 1901
1901-1902	September 23, 1901	May 14, 1902
1902-1903	October 22, 1902	April 17, 1903
1903-1904	November 7, 1903	May 1, 1904
1904-1905	September 23, 1904	May 11, 1905
1905-1906	November 16, 1905	May 28, 1906
1906-1907	November 3, 1906	April 15, 1907
1907-1908	October 16, 1907	May 14, 1908
1908-1909	September 23, 1908	March 25, 1909

POPULATION.

Considering that California was only admitted as a State on September 9, 1850, and that Fresno was only organized as a county in 1856, its steady increase in population and prosperity has been wonderful. When we come to consider the results which have been obtained within less than the span of an ordinary lifetime by a mere handful of people, it is simply marvelous. In 1860, the population was 4,605; 1870, 6,336; 1880, 9,478; 1890, 32,026; 1900, 37,862.

Fresno would have had a population of upwards of 44,000 in 1900 if the northern part of the county had not been formed into Madera County.

In 1900, Fresno City had a population of 12,470, which, within the last ten years, has doubled, while the population of the county is expected to show an increase at the coming census to upwards of 60,000.

The growth of population is further shown by the increased number of schools, teachers and pupils during the last ten years.

Number of schools—Years.	1899.	1909
Grammar	122	115
High	5	11
Kindergarten	0	1
Number of teachers—		
Grammar	192	324
High	17	55
Kindergarten	0	1
Special	0	3
Number of pupils	7,975	15,861
Average attendance—		
Grammar	4,948	9,872
High	306	962
Kindergarten	0	62
Lost to Kings County—		
Grammar schools	...	3
Grammar teachers	...	5
Number of pupils	...	191

FARMS AND FARMING.

The county has passed through four stages of development. First came mining in the early days before it was organized as a county, and this period extended to about 1860-64. Secondly, came the stock-raising period, which arose upon the gradual disappearance of placer mining, and lasted until 1874, although sheep raising still continued on a large scale; thirdly, about 1868, the farming interest sprang up, although prior to the advent of the railroad in 1870, agriculture amounted to very little. The fourth and most important may be called the viticultural and fruit era, which began to come into prominence early in the eighties, and has now become the leading feature of the county.

There is a mistaken impression among many homeseekers that farms and vineyards are all on a large scale, but the days of enormous land grants and ranches is over, and the land is now being rapidly subdivided and settled.

The following figures will serve to illustrate the progress made in thirty years, between 1870 and 1900:

	1870.	1880.	1890.	1900.
Farms of 3 acres and under 10 acres	111	10	26	103
10 and under 20	11	13	93	215
20 and under 50	37	129	704	1,230
50 and under 100	23	68	196	460
100 and under 500	53	568	943	866
Acres improved	24,536	421,378	951,490	786,337

The value of land and buildings increased enormously during the same period, the amount being:

Year.	Value.
1870	$629,705
1880	4,403,152
1890	46,755,740
1900	37,293,670

The apparent falling off in 1900 is owing to a large slice of Fresno County having been made into Madera County in 1893.

IRRIGATION.

As California holds the first place among all the States in the Union in irrigation, so Fresno is the leading county in the State, both in number and extent of its canals and ditches, having more than double the acreage under irrigation than any other county. In 1880 there were only about 65 miles of main canals in the county, whereas, now there are upwards of 400 miles of canals and ditches, irrigating some 400,000 acres. Most of the canals are owned by corporations, whose interests are entirely separate and distinct from the ownership of the land irrigated. The remainder are owned by companies, the stock of which is, for the most part, in the hands of the land owners. Many of the canal companies have been amalgamated in recent years, the four largest now in existence being:

The Fresno Canal and Irrigation Company.
San Joaquin and Kings River Canal.
The Consolidated Canal.
Liberty Canal Company.

Nearly all draw their water from the Kings River. The combined capacity of these canals is said to be approximately 4,000 cubic feet per second. The water is much cheaper than in many other parts of the State, being only 62½ cents an acre per annum.

FARMS AND FARM PRODUCE—CEREALS.

In the cultivation of cereals, the county has fallen off greatly during the last nine years, especially in wheat and barley.

The acreage in 1909 is reported as follows, but is really much larger (from the assessor's books):

Crop.	Acres.
Wheat	9,650
Barley	8,500
Corn	500
Alfalfa hay	35,000
Grain and grass hay	2,300

DAIRY PRODUCTS.

During the last ten years the dairy industry has made great progress, except in the manufacture of cheese, which, however, was never produced on a very large scale. There are now only about half a dozen cheese factories, and their output is small.

In 1898 only 291,754 pounds of butter was produced, and 604,861 in 1900.

The average price for butter fat paid to farmers during the year 1909 was:

	Cents per lb. Sweet.	Sour.		Cents per lb. Sweet.	Sour.
January	38	36	July and August	36	33
February and March	37	35	September	36½	34
April	36	33	October	37	36
May and June	35	32	November and December	37	35

Year ending Oct. 1.	Butter, lbs.	Cheese, lbs.
1903	1,393,158	116,180
1904	1,619,746	150,156
1905	2,166,048	52,154
1906	2,644,897	.....
1907	2,786,817	.....
1908	3,341,895	.....
1909 (figures not complete; estimated)	4,000,000	.....

Price of live stock paid to farmers in Fresno County in 1909:

Sheep	$3.50 to $5.50 per head
Lambs	$2.50 to $3.50 per head
Beef cattle, dressed	5c to 9c per pound
Veal, dressed	5c to 7c per pound
Veal	6c to 8c per pound
Hogs	5c to 7c per pound
Sheep pelts (according to extra long, long, medium, and short wool skins)	20c to $1.50 each
Lambs' wool	60c to 75c
Dry hides (steers)	$20 to $21.50
Wet salt hides (steers)	$12 to $13.50

VINEYARD AND ORCHARD FRUITS.

Including grapes, Fresno produces more fruit than any other county in the State, and California produces 25 per cent of the total value of fruit raised in the United States.

Fresno County holds the first place in the production of grapes, raisins, figs, sweet wines and brandy, and is one of the leading counties of the State in the production of peaches, apricots, and olives, and the acreage in citrus fruits is spreading.

THE RAISIN INDUSTRY.

Raisins were first produced in California on a small scale, as early as 1867, but it was not until 1873 that the crops cut any figure in the market. Consul Ridgely, writing from Spain says that, were it not for the duty, exporters would undoubtedly undersell California growers.

Fresno County was one of the first to enter upon this industry, which has kept on growing until the county now produces on an average fully three quarters of the entire crop, and manufacture of seeded raisins is practically entirely in Fresno and the surrounding districts. Some twelve or fifteen years ago dried grapes (wine grapes) were produced to the amount of some four or five million pounds, but they have fallen off to less than a million pounds.

During the six years of its existence, the California Raisin Growers' Association in Fresno handled the bulk of the crop, the total quantity of raisins delivered to it, and the prices paid being as follows:

Year.	No. of lbs.	Sweat box price paid to growers, per ton.
1898	65,024,000	$54.00
1899	52,410,750	86.00
1900	71,936,000	76.00
1901	54,106,592	60.00
1902	85,177,864	76.00
1903	97,011,106	48.00

The net average price for the six years was $66.66. Of the above quantity, the following were Sultanas or Thompson Seedless:

Year.	No. of lbs.
1898	2,003,500
1899	1,239,250
1900	3,928,000
1901	2,657,741
1902	3,430,872
1903	6,314,271

Unfortunately, no record is kept of the price of raisins and other products from year to year, and it is, therefore, almost impossible to trace the price in previous years. The Fresno raisin crop in 1909 was about 50,000 tons, but the quality was not up to the average, and there were fewer four crowns than usual. Thompson Seedless was a poor average crop, and Sultanas were about normal.

In 1908 the sweat box price was up to 3¾ cents per pound in the early part of the season, but fell away to 1¾ cents.

In 1909 the price has ranged from 1¾ cents to 2¾ cents.

Fresno County is the center of the seeded raisin industry, as already stated, and most of the seeded raisins come from this county, the larger proportion from Fresno City itself. The business has increased by leaps and bounds, and the demand is increasing year by year, as the following summary will show:

Year.	No. of tons.	Average price per lb.
1896	700	10 cents
1897	3,500	9 cents
1898	7,000	8 cents
1899	12,000	8 cents
1900	14,000	6½ cents
1901	14,000	7 cents
1902	16,000	7½ cents
1903	18,000	6½ cents
1904	18,000	5½ cents
1905	21,000	6½ cents
1906	24,000	7 cents
1907	26,000	8½ cents
1908	25,000*	...
1909 (to November 30)	35,000†	...

* Fancy grades: Highest, 6¼ cents; lowest, 4½ cents.
† Fancy grades: Highest, 5½ cents; lowest, 4½ cents.

CITRUS FRUITS.

The cultivation of citrus fruit is spreading rapidly in central and northern California, and in time will rival the southern part of the State in size of the crops. Here they have the advantage of ripening several weeks earlier than in the south, while the quality is equal to the best produced elsewhere. Oranges were first raised in the Centerville district as early as 1866, but it is only in recent years that they have been produced on a commercial scale. This season they are unusually large in size.

The shipments of oranges raised in Fresno County during the last four seasons have been in round numbers, as follows:

Season.	Oranges, cars.	Lemons, cars.
1905-6	150	15
1906-7	200	15
1907-8	210	20
1908-9	220	12

A car load consists of 362 boxes of oranges and 312 of lemons.

The price paid to Fresno growers for the last season was:

	Highest.	Lowest.
Navels, per box	$1.45	$0.90
Valencias, per box	2.00	1.50
Lemons, per box	2.00	0.75

The navels averaged about $1.25 per box; the Valencias about $1.75, and the lemons about $1.50 net to the grower.

OLIVES AND OLIVE OIL.

Fewer records appear to have been kept regarding this industry than most others. There are, according to the best authorities, about 12,000 to 14,000 acres of olives planted in the State, of which almost half are in bearing. Last year about 350,000 gallons of olive oil and 450,000 gallons of pickled, ripe and green olives were produced in the State.

Fresno has a larger acreage in olives than any other county in the San Joaquin Valley.

Fresno County produced the following quantities:

Year.	Pickled Olives, gallons.	Olive Oil, gallons.
1905	10,000	2,500
1906	5,000	5,000
1907	40,000	14,000
1908	45,000	16,000
1909	38,000	12,000

In 1899 Fresno produced only 1,550 gallons of olive oil.

WINE AND BRANDY.

The production of sweet wine and brandy during the last few years has been as follows (gallons):

	California.		Fresno County.	
Year.	Sweet Wine.	Com. Brandy.	Wine.	Brandy.
1905	11,502,000	1,200,000	.....	.....
1906	15,992,000	1,345,000	.....	.....
1907	16,304,000	1,450,000	6,000,000	1,250,000
1908	14,500,000	1,500,000	6,800,000	1,000,000
1909	16,000,000	1,800,000	7,500,000	1,200,000

Fresno County also produced about 150,000 gallons of dry wine in 1909.

There are twenty-four wineries and twenty-seven distilleries in Fresno County. With the exception of four, which are distilleries only, the remainder are attached to wineries. The proportions of the various kinds of sweet wines produced in the State are approximately as follows (in some years the production of port wine takes the lead; in other years, sherry):

Wine.	Gallons.
Sherry	6,260,000
Port	6,020,000
Muscat	2,200,000
Angelica	1,300,000
Malaga	210,000
Tokay	10,000
Total	16,000,000

The price that vineyardists received for their crops varies considerably from year to year. In Fresno and the adjoining counties, the

average price per ton paid for grapes containing not less than 24 per cent of sugar has been as high as $16, and the last five years has been as follows:

Year.	Wine Grapes.	Muscats.
1905	$10.00	$12.00
1906	12.00	14.00
1907	12.00	14.00
1908	6.00	8.00
1909	5.00 to $6.50	8.00 to $8.50

DRIED AND CANNED FRUITS.

(Approximate quantities and average prices.)

Dried Fruits.

Fruit.	Quantity, 1909, tons.	Price per lb., 1909, cents.	Price, 1908, cents.
Apricots	750	7 to 8½	5 to 7
Figs	2,100	2 to 2¾	2 to 2½
Nectarines	450	3½ to 5	3¾ to 5½
Peaches	8,500	3¾ to 5	3¾ to 6
Pears	100	5 to 7	4 to 6
Plums	50	4 to 6	4 to 6
Prunes	750	1¾ to 2½	1½ to 2
Raisins	50,000	1¾ to 2¾	1¾ to 3¾

Green Fruit for Canning.

Fruit.	Quantity, 1909, tons.	Price per ton, 1909.
Apricots	200	$20.00 to $30.00
Peaches—		
Tuscan Cling	400	22.50
Orange Clings	500	15.00 to 20.00
Phillips Clings	350	22.50 to 25.00
Early Crawford and Foster	110	20.00
Muirs, Freestone	500	15.00
Lovells	200	20.00
Total peaches, tons	2,260	
Plums	30	14.00

FIGS.

The quantity of figs in Fresno takes the lead, has much improved of late years, and the fruit appears to be growing in favor.

The quantity packed in Fresno in the last five years has been:

Year.	Tons.
1905	2,500
1906	2,700
1907	3,300
1908	3,800
1909	2,100

BEES AND HONEY.

The production of honey varies greatly, according to weather conditions. The honey crop in 1909 in California has been the best in the history of the State, amounting to some 11,000,000 pounds, compared with 2,800,000 pounds ten years ago, and 4,500,000 pounds in 1908.

In 1899 Fresno produced 567,800 pounds of honey; in 1908, 777,050 pounds; the estimated crop for this season being 1,400,000 pounds. In the county there are 670 hives valued at about $1 each.

POULTRY.

In Fresno County there are 24,680 dozen chickens valued conservatively at $3 per dozen, or $73,940.

MARKET GARDENING.

Melons and pumpkins of all varieties are grown in considerable quantities with success.

Berries are grown in limited quantities in some districts.

The quantity and value of vegetables raised in the county is comparatively small, the temperature during the summer months being more suited to grapes and orchard fruits.

FISH AND GAME.

The varieties of fish include salmon, black bass, trout and catfish, all of which are plentiful.

There is an abundance of game, including quail, doves, a large variety of ducks and wild geese, but there is no means at present of ascertaining either the quantity or money value of either fish or game.

THE LUMBER INDUSTRY.

The value of this industry to the county is very considerable, varying from sixty to seventy-five million feet, board measure, with an average value of some two million dollars a year. The different varieties are approximately as follows:

Year.	Sugar Pine.	White Pine.	Fir.	Sequoia.	Total.
1905	9,000,000	6,000,000	30,000,000	15,000,000	60,000,000
1906	9,000,000	6,000,000	30,000,000	15,000,000	60,000,000
1907	10,000,000	5,000,000	35,000,000	20,000,000	70,000,000
1908	9,000,000	4,000,000	35,000,000	10,000,000	58,000,000
1909	11,000,000	6,000,000	30,000,000	.....	47,000,000

NOTE.—Feet, board measure.

The price of lumber was about ten per cent higher in 1909 than in the previous year.

COALINGA OILFIELDS.

In the last ten years the production of petroleum in Fresno County has developed from a small beginning into one of its most important industries.

In 1897 only 70,140 barrels were produced. Since then the following has been the rate of increase:

Year.	Production.*	Value.
1899	439,372	.....
1900	532,000	$532,000
1901	780,650	390,325
1902	572,498	257,629
1903	2,138,058	705,559
1904	5,114,958	1,520,847
1905	10,967,015	2,657,009
1906†	7,991,039	1,848,300
1907†	8,871,723	3,091,934
1908	10,725,389	5,898,964
1909 (estimated)	12,000,000	6,250,000

* Barrels of 42 gallons each.

† The production was reduced during these years owing to low prices. At the beginning of 1909 it was estimated that 2,825,000,000 barrels remained available in the field, and at the present rate of production this supply would last over two hundred years.

MANUFACTURES.

The latest figures regarding the manufactures in the State show that the largest increase in the value of products was in Fresno, and amounted to 257.9 per cent; and also, that in every other item, except the number of establishments, the increase amounted to more than 135 per cent. The great increase in the manufactures in Fresno is due chiefly to the increase in the canning and preserving of fruits.

The percentage of increase in value of products in nine of the leading cities of the State, in order of increase, is as follows:

Fresno	257.9 per cent
San Diego	194.8 per cent
Pasadena	192.4 per cent
Los Angeles	130.0 per cent
Berkeley	126.3 per cent
San Jose	94.1 per cent
Oakland	69 per cent
Alameda	47.8 per cent
Stockton	45.3 per cent

There are several foundries, agricultural implement works, iron works, macaroni and soap factories, and many others, which have come into existence or been greatly extended during the last two years, but space will not allow further reference to them.

MINERALS.

Fresno County is rich in minerals, but as yet little has been done to develop what some day will be a great and prosperous industry. The great difficulty in the way of opening up some of these valuable deposits has hitherto been the want of good roads and cheap transportation facilities. Gold quartz veins are plentiful along a wide belt of the rugged and well timbered and watered Sierra slope in the county, but its mineral resources have been but slightly exploited. The varied mineral resources of the county that have been partially developed are mainly in the lower foothills of both the Sierra and Coast Range.

Gold, silver, copper, antimony, iron, bismuth, chrome, magnesite, building stone, and mineral waters are among the minerals awaiting utilization.

The copper deposits that have so far been in any way worked are all near the northern side of the county.

VALUE OF MINERAL PRODUCTS IN THE LAST FIVE YEARS.

Substance.	1904.	1905.	1906.	1907.	1908.
Asphalt	$6,948	.....	.....	.....	$5,500
Brick	32,400	60,000	64,000	57,350	106,960
Potters clay	.....	.....	.....	.....	26,000
Copper	319	224,640	88,000	50,000	.....
Gold	7,809	40,037	8,493	2,401	1,054
Granite	.....	.....	.....	10,500	16,900
Magnesite	120	.....	.....	.....	.....
Mineral water	2,400	.....	.....	.....	.....
Petroleum	1,520,847	2,400,300	1,974,470	3,620,120	5,898,964
Silver	4	9,187	83	26	11
	$1,570,847	$2,734,164	$2,135,046	$3,740,397	$6,055,389

Substance.	Quantity. 1907.	1908.
Asphaltum (tons)	.....	500
Brick (millions)	9,230	13,220
Clay (tons)	.....	9,000
Copper (pounds)	250,000	.....
Gold (value)	$2,401	$1,054
Petroleum (barrels)	9,050,300	10,725,389
Silver (value)	$26	$11
Granite (cubic feet)	9,200	16,900

NOTE.—The figures for 1909 are not yet complete.

The above is but a brief summary of the products and resources of Fresno County. Only the leading and most important industries have been dealt with, but the facts and figures speak for themselves, and prove that there is a great future in store for this county.

STATISTICS OF FRESNO COUNTY, 1908-9.

General Statistics.

Area, 6,035 square miles, or 3,862,400 acres.	
Number of farms in 1900	3,290
Number of acres assessed	2,395,500
Value of country real estate	$22,408,371
Of improvements thereon	$5,765,267
Of city and town lots	$5,930,035
Of improvements thereon	$5,839,383
Of personal property	$7,701,201
Total value of all property	*$48,067,706
Expended on roads, last fiscal year	$228,215
Expended for bridges, last fiscal year	$14,580
Number of miles of public roads	2,300
Road levy per $100, 1909	38c
Value of county buildings	$1,260,000
Irrigating ditches, miles	400
Railroads, steam—miles, 269; assessed value	$5,887,919
Railroads, electric—miles, 20; assessed value	$70,615
Electric power plant—1 steam; assessed value	$48,400
Electric power lines—miles, 140; assessed value	$60,271
Number of acres irrigated	400,000

*Partly from the assessor's books.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,890	$56,700
Stock	23,500	282,000
Dairy cows—		
Thoroughbred	196	9,800
Common	23,650	473,000
Calves	7,320	36,600
Swine	8,680	17,190
Horses—		
Thoroughbred	120	3,600
Common	15,938	637,520
Colts	1,670	25,050
Jacks and jennies	53	680
Mules	2,530	183,750
Sheep	53,040	107,100
Lambs	27,000	20,250

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	17,300	2,000	19,300
Apricot	126,735	12,300	139,035
Fig	84,460	20,800	105,260
Lemon	12,480	8,230	20,710
Nectarine	22,500	980	23,480
Olive	36,900	4,270	41,170
Orange	72,930	24,000	96,930
Peach	2,387,200	982,860	3,370,060
Plum	6,280	4,320	10,600
Prune	69,320	21,000	90,320
Total	2,836,105	1,080,760	†3,916,865
Almond	4,300	2,260	6,560
Grapevines	77,953	17,270	95,223

†Owing to want of time these figures are taken from the assessor's books, and as is always the case for taxation purposes, owners very much underrate the value of their property.

NOTE.—The acreage in grapes is also much underestimated, especially for wine grapes.

Wines, Brandies, Etc.

	Gallons.
Dry wines	150,000
Sweet wines	7,500,000
Brandy	1,200,000

Number of wineries, 24; distilleries, 27; breweries, 1.

Cereal Products and Hay.

	Acres.
Wheat	9,650
Barley	8,500
Oats	1,200
Corn	500
Total cereals	19,850
Alfalfa hay	35,000
Grain and grass hay	2,300
Total hay	37,300

GLENN COUNTY.

Glenn County lies near the center of the Sacramento Valley, extending from the summit of the Coast Range across the Sacramento eastward containing an area of 1,550 square miles, one third being mountainous, but affording good summer pasture for stock, about the same area is foothills, with many fertile ranches, the remaining third is level or prairie land, which has been for forty years cultivated to grain, mostly wheat, and in some sections still producing good crops; the climate of Glenn is diversified as well as the soil and one can find a home to suit any taste or condition. Willows, the county seat is 150 miles north of San Francisco on the main line of the Southern Pacific road to Oregon, branch lines extend to Fruto, 18 miles wesward, and to Hamilton City, the site of a sugar plant on the northeast corner.

There are two high schools in the county, one at Willows, one at Orland; two new school districts have been formed in the last six months.

The United States Government irrigation system, known as the Orland project, is well under way, and has caused quite a boom in and around the Orland section, lands being subdivided and many new comers building on ten and twenty-acre tracts.

The taking over of the old Central Canal by the Pittsburg syndicate has caused a stir around Willows, the company having five different surveying crews working on the laterals to be extended over 150,000 acres. The company expects to have 1,000 forty-acre tracts ready for settlement before spring, and seem assured that every tract will be taken as soon as the water is there. The officials and clerical staff at Willows number over half a hundred, and all seem busy and doing something.

Eastern capital has acquired a large tract on the east side of the river and are making a success of settling and selling their holdings. A Nevada corporation purchased several sections between Willows and Germantown last spring and planted 60,000 eucalyptus trees, which are now from three to ten feet high, notwithstanding the lack of any rain last spring, the loss being only 2 per cent. The land planted has all been sold in five and ten-acre tracts.

The Alfalfa Farms Company is also selling many tracts of alfalfa land with water rights. The success of these several enterprises will result in the subdivision of all the larger tracts, and the combined harvester will soon be supplanted by busy hands tilling their own holdings.

One enterprising farmer planted a large tract to flax last spring, but there being no rain whatever, the crop was very light, but it demonstrated the fact that flax will grow and be profitable. Experiments with rice proved that it will grow, but to buy water at four dollars per acre rendered the business unprofitable. Cotton experiments along the Sacramento bottoms show that cotton could be raised at good profits. In fact, there are very few of the necessities or luxuries that grow out of the ground that can not be successfully produced in Glenn County. Coffee, tea and bananas are about all that will not grow out in the open.

The population of the county has increased considerably during the last six months and they still come. Glenn County is forging ahead. The sandstone, cement, and manganese possibilities still lie unworked.

STATISTICS OF GLENN COUNTY, 1908-9.

General Statistics.

Area, 15,457 square miles, or	989,344 acres.
Number of farms	1,131
Number of acres assessed	642,419
Value of country real estate	$8,670,926
Of improvements thereon	$645,845
Of city and town lots	$193,350
Of improvements thereon	$215,015
Of personal property	$1,445,418
Total value of all property	$11,340,193
Expended on roads, last fiscal year	$47,390
Expended for bridges, last fiscal year	$66,166
Number of miles of public roads	474
Road levy per $100, 1909	40c
Value of county buildings	$135,300
Irrigating ditches—miles, 86; cost	$78,500
Railroads, steam—miles, 55.78; assessed value	$1,328,772
Railroads, electric—miles, 4.9; assessed value	$27,726
Electric power lines—miles, 32; assessed value	$49,440
Number of acres irrigated	2,415

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	16,420	6,828	$205,875
Barley	46,620	27,972	839,160
Oats	1,155	866	25,980
Corn	560	504	15,120
Total cereals.	64,755	36,170	$1,086,135
Alfalfa hay	2,840	8,520	$77,560
Grain hay	14,980	16,840	185,240
Total hay	17,820	25,360	$262,700

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	3,285	660	3,945
Apricot	4,290	215	4,505
Cherry	365	55	420
Fig	1,620	2,000	3,620
Lemon	3,640	500	4,140
Nectarine	62	25	87
Olive	1,660	355	2,015
Orange	6,320	2,100	8,420
Peach	5,500	820	6,320
Pear	2,750	190	2,940
Plum	970	485	1,455
Prune	7,600	320	7,920
Quince	105	.....	105
Total fruit trees.	38,167	7,725	45,892
Almond	6,840	620	7,460
Chestnut	10	.....	10
Pecan	32	4	36
Walnut	2,020	645	2,665
Total nut trees.	8,902	1,269	10,171
Grapevines	31,355	1,500	32,855
Berries, acres	34	21	55

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	2	197,854	$59,326

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	90,480	$1,918
Apricots	61,400	1,842
Blackberries	15,000	750
Beans	21,200	636
Corn	120,300	3,609
Cherries	3,800	380
Figs	41,200	824
Grapes	486,000	7,290
Lemons, boxes	805	2,415
Loganberries	42,800	1,284
Onions	156,800	1,568
Oranges, boxes	3,320	7,470
Olives	14,800	410
Pears	94,300	1,886
Peaches	66,720	1,334
Peas	4,380	175
Persimmons	4,650	93
Plums	12,400	296
Irish potatoes	412,400	4,124
Sweet potatoes	39,180	783
Prunes	23,400	483
Raspberries	7,900	395
Strawberries	14,440	722
Tomatoes	411,300	4,113
Totals	2,149,335	$44,803

Dried—	*Pounds.*	*Value.*
Almonds	74,500	$8,940
Apples	12,000	720
Figs	1,090	65
Prunes	185,000	5,550
Totals	$272,590	$15,275

Live Stock Industry.

	Number.	*Value.*
Cattle—Stock	9,620	$144,300
Dairy cows—Graded	1,584	47,520
Thoroughbred—		
Angus	11	660
Holsteins	8	600
Jersey	34	1,700
Calves	4,125	33,000
Swine	8,398	25,194
Horses—		
Thoroughbred	3	6,000
Common	2,096	104,800
Colts	1,495	29,900
Jacks and jennies	17	8,500
Mules	2,650	98,800
Sheep	90,890	272,670
Lambs	6,930	13,860
Angora goats	4,155	12,465
Total stock all kinds.	132,016	$799,969
Wool, pounds	388,000	$42,680
Mohair, pounds	20,755	5,196

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	3,174	$9,522
Ducks	156	692
Geese	34	306
Turkeys	702	10,630
Eggs	81,000	16,200
Total value		$37,350

STATISTICS OF GLENN COUNTY, 1908-9—Continued.

Fish Industry.

	Pounds.	*Value.*
Salmon	41,600	$2,913
Other kinds	9,350	748
Totals	50,950	$3,661

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Sewer pipe	1	5	$8,300
Sugar, beet	1	300	520,000

Manufactured Output.

	Quantity.
Cigars	65,000
Lard, pounds	6,000

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	100,390	$200,780
Sawmills, number	1	5,000
Lumber, feet	940,000	14,100
Total value		$229,880

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 425		$1,400
Broomcorn	101,840	4,080
Honey	3,300	330
Flax seed	101,500	1,522
Sugar beets, tons	17,110	85,550

HUMBOLDT COUNTY.

Humboldt County, lying in the northwestern part of the State of California and extending from the parallel of 40 degrees north latitude to within about 35 miles of the southern boundary of the State of Oregon, occupies a strip of territory 108 miles long with an average width of about 37 miles. Its area is 3,507 square miles, 2,244,480 acres, and is more than three times that of Rhode Island, about twice that of Delaware and five sevenths that of Connecticut. While the greater portion of the county's surface is hilly, there is considerable level land around Humboldt Bay and along the numerous rivers which flow down from the mountains to the sea. Nearly all this land is very fertile and productive, and is principally utilized for farming, dairying and fruit raising. The soil of the mountainous portions of the county is, to a great extent, extremely productive when brought under cultivation, but such lands are chiefly used for grazing purposes.

The county is blessed with a bounteous rainfall, 47.55 inches being the average per annum.

There are abundant streams and springs throughout the county which furnish plenty of good cold water to its inhabitants the year round.

A variety of wild game and fish abound in the mountains and streams of the county.

Lumbering is the chief industry of the county, the exports of our lumber mills, shingle mills, sash and door factories, etc., aggregating 250,000,000 feet yearly besides that which is used for building and other purposes within the county, which is considerable.

The heavily timbered redwood forests alone cover more than 500,000 acres of land, while the forests of pine, oak and other woods occupy 400,000 more.

The supply of standing timber within the county is estimated at over 51,000,000,000 feet, of which 45,000,000,000 feet are redwood.

As a revenue producer dairying holds second place, and Humboldt is foremost of all the counties in the United States in the production of butter, condensed milk, etc.

Fruit raising is a business of much importance to the county. Apples grown here are as fine as any raised on the coast, and are nearly altogether free from insect pests; the troublesome codling moth, which is so ruinous to the apple business in a great many localities, is wholly unknown here. Considerably over a hundred thousand boxes of choice apples are annually shipped from the county to San Francisco and other points along the coast and quite a number of the same going to the Australian markets.

All other fruits of the temperate zone, as well as a great variety of berries, grown in profusion in all parts of the county wherever cultivated, and immense quantities of wild blackberries, huckleberries, and other kinds grow wild in almost every section of the county.

Humboldt County, while not particularly noted as an agricultural county, yields perhaps the largest returns per acre of vegetables, hay, and grains of any locality on the Pacific coast.

Stock raising is carried on extensively throughout the county, and is one of the most important of its industries. Something like 6,000 head of beef cattle, 3,500 mutton sheep, and 3,500 hogs, aggregating in value about $400,000, are annually shipped from the county.

The growing of wool is by no means an insignificant business, as average yearly shipments of nearly 800,000 pounds of good clean wool are made.

Gold mining is also carried on to some extent, the annual output being over $100,000.

Quantities of good building stone, such as granite and sandstone, are found in many localities. Limestone is plentiful in the eastern part of the county; coal, lignite, and petroleum exist, but have not been sufficiently developed as yet to demonstrate their quantity and value.

Mineral waters are plentiful, and one of them—"Humboldt Water"—is an article of commercial export.

Among other industrial pursuits carried on within the county are those of shipbuilding, salmon fishing in the rivers, deep sea fishing, the gathering of tanbark, poultry raising, etc.

There are three daily, seven weekly and one semiweekly newspaper printed in the county.

We have 122 public school buildings, and employ nearly 200 teachers. Of the above four are high school buildings.

There are also about sixty churches in the county.

Humboldt has an exceeedingly equable climate. On the coast the thermometer seldom rises above 70 degrees in summer or falls below 40 degrees in winter. Inland among the hills it gets considerably warmer in summer and somewhat colder in winter.

Eureka, the county seat, is an incorporated city of something over 12,000 inhabitants, situated on Humboldt Bay, a sheltered landlocked harbor 14 miles long and from 1 to 4 miles wide. Eureka has broad, well drained and graded streets, an excellent sewer system and a splendid volunteer fire department. There are 15 miles of electric railroad within the city and one steam road runs through it. Of the eight banks in the county, five of them are located in Eureka. Eureka also has electric light and power and gas plants, excellent public schools, a progressive business college, a preparatory school, a dozen churches, plenty of benevolent and fraternal societies, three daily and two weekly newspapers, one opera house, two theaters, numerous stores, restaurants, hotels and business houses.

Eureka may be reached by steamer, either from San Francisco or the northern ports, at all times of the year and by overland auto-stage during the summer time. Actual construction work is now being carried on by the Northwestern Pacific Railway Company to close the 105-mile gap between Pepperwood, in Humboldt County, and Willits, in Mendocino County. When this piece of work is completed we will be connected up by rail with the balance of the world.

STATISTICS OF HUMBOLDT COUNTY, 1908-9.

General Statistics.

Area, 3,507 square miles, or 2,244,480 acres.	
Number of acres assessed	1,596,820
Value of country real estate	$17,191,480
Of improvements thereon	$1,195,705
Of city and town lots	$4,696,585
Of improvements thereon	$2,839,445
Of personal property	$2,828,011
Total value of all property	$28,751,226
Expended on roads, last fiscal year	$92,785
Expended for bridges, last fiscal year	$25,195
Number of miles of public roads	1,190
Road levy per $100, 1909	60c
Value of county buildings	$370,000
Railroads, steam—miles, 130; assessed value	$1,065,425
Railroads, electric—miles, 12; assessed value	$65,450
Electric power plants—2; assessed value	$185,000
Electric power lines— miles, 92; assessed value	$15,000
Pacific Telephone and Telegraph Co.	$66,819
Western Union Telegraph Co.	$4,050

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	150	145	$4,350
Barley	550	600	1,800
Oats	2,350	1,440	43,200
Corn	100	.....	.....
Total cereals	3,150	2,185	$49,350
Alfalfa hay	200	1,000	$15,000
Grain hay	5,500	11,000	176,000
Grass hay	7,500	11,200	112,000
Total hay	13,200	23,200	$303,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	102,000	6,000	108,000
Cherry	2,000	.....	2,000
Peach	2,500	1,000	3,500
Pear	1,500	.....	1,500
Plum	500	.....	500
Prune	15,000	.....	15,000
Quince	500	.....	500
Total fruit trees	124,000	7,000	131,000
Walnut	400	.....	400
Berries, acres	.....	.....	250

Wines, Brandies, Etc.

	Gallons.	*Value.*
Beer, barrels	14,684	$132,156
Cider	45,375	15,000
Vinegar	31,500	5,000

Number of breweries, 1.

Fish Industry.

	Pounds.	*Value.*
Salmon	3,600,000	$110,000
Other kinds	300,000	10,500
Totals	3,900,000	$120,500

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	3,070	$92,100
Stock	23,580	353,700
Dairy cows—Graded	16,820	504,600
Thoroughbred—		
Holsteins	75	7,500
Jersey	345	34,500
Calves	10,320	61,920
Swine	8,824	25,472
Horses—		
Thoroughbred	4	2,000
Standard-bred	540	54,000
Common	8,760	394,200
Colts	868	21,700
Mules	390	15,600
Sheep	83,215	332,860
Lambs	37,100	74,200
Angora goats	200	1,000
Common goats	2,524	7,572
Total stock all kinds	196,635	$1,982,924
Wool, pounds	601,000	$120,200

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	9,135,000	$136,925
Blackberries	450,000	22,500
Beans	15,500	465
Beets	650,000	2,600
Cabbage	250,000	3,750
Celery	20,000	1,600
Cauliflower	32,000	96,000
Corn	40,000	1,600
Cherries	60,000	3,000
Gooseberries	3,500	280
Loganberries	7,000	700
Onions	10,000	200
Pears	80,000	1,200
Peaches	180,000	7,200
Peas	60,000	3,000
Plums	12,000	360
Irish potatoes	3,000,000	30,000
Prunes	550,000	5,500
Quinces	6,000	180
Raspberries	6,000	600
Strawberries	90,000	9,000
Total		$326,660

Dried—	*Pounds.*	*Value.*
Beans	15,000	$450
Peas	60,000	1,800
Prunes	25,000	1,000
Walnuts	4,000	600
Total		$3,850

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	12	.....	.....
Skimming stations	15	.....	.....
Butter, pounds		4,550,000	$1,592,500

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	6,325	$31,625
Ducks	245	1,470
Geese	97	873
Turkeys	512	12,288
Eggs	550,000	165,000
Total value		$211,256

STATISTICS OF HUMBOLDT COUNTY, 1908-9—Continued.

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	915,000	.....
Pine, acres	465,000	.....
Redwood, acres	450,000	.....
Sawmills, number	16	.....
Fuel, wood, cords	40,000	$120,000
Laths, thousand	800	2,800
Lumber, feet	350,000,000	6,700,000
Pickets, pieces	94,000	1,880
Piles	4,300	12,900
Posts, pieces	102,000	15,300
Railroad ties, pieces	525,000	262,500
Sash and door factories, number	7	.....
Shakes, thousand	12,105	121,050
Shingles, thousand	800,000	1,200,000
Stave bolts, cords	610	4,880
Total value		$8,361,310

Power used for mills and manufactories in county—Steam, 93; electrical, 5.

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Brick	3	15	.....
Cigars	9	29	$85,000
Confectionery	5	....	.....
Foundries and iron works	3	85	200,000
Meat products—Hides, lard, meat packed, tallow	....	....	96,735
Marble	2	....	.....
Tanneries	3	....	225,000
Woolen mills	1	65	150,000
Ice	2	11	16,000
Boiler works	1	27	75,000

Manufactured Output.

	Quantity.
Cigars, thousand	15,000
Hides, lard, meat packed, and tallow, pounds	1,378,490

IMPERIAL COUNTY.

Imperial is the youngest county in the State, having been formed in 1907 from the eastern part of San Diego County, formerly known as the "Colorado Desert, or Imperial Valley." The progress of the county is practically confined to the central part of the valley.

Dairying is very profitable, owing to the fact that we have alfalfa growing throughout the winter, and furnishes an abundant supply of green pasturage. We have modern creameries with latest appliances and are located in different sections. The stock used for dairying purposes is of a very high grade, mostly pure-bred representatives of the milk strains.

Imperial Valley is one of the best stock, hog and poultry producing countries in the West, and there are also various other industries which are receiving considerable attention.

There is reason to believe that the cultivation of cotton may hold a most important part in the industrial development of Imperial County, and those interested feel greatly encouraged over the outlook.

The center of this wonderfully fertile valley is reached by a spur from the main line of the Southern Pacific Railroad.

The most important towns of the valley are Imperial, El Centro, Holtville, Brawley, and Calexico. There are located in these towns seven strong banking institutions. The hotel accommodations are excellent, and there are a number of sunny modern lodging houses. The school and church accommodations of the valley are excellent.

Imperial Valley is 110 miles long by 40 miles wide, half in California, half in Mexico. Present irrigated area, 40 by 25 miles in California.

Irrigated from Colorado River; 500,000 miner's inches available.

Area of irrigable land in Imperial County, 400,000 acres. In cultivation, 200,000 acres.

Length of canals, about 600 miles.

Maximum temperature 1908, at El Centro, 113 degrees.

Average rainfall, 4.4 inches.

Value of products 1906, $1,170,500.

In 1907, 1,200 acres of cantaloupes netted growers $327,790. In 1908, more than 9,000 acres of cantaloupes were grown, and 1,959 car loads were shipped.

Present population of Imperial County about 20,000.

STATISTICS OF IMPERIAL COUNTY, 1908-9.

General Statistics.		General Statistics—Continued.	
Area, 4,000 square miles, or 2,560,000 acres.	2,560,000	Expended for bridges, last fiscal year	$25,305
Number of farms	3,947	Road levy per $100, 1909	40c
Number of acres assessed	731,520	Value of county buildings	$25,000
Value of country real estate	$4,208,556	Irrigating ditches, cost	$3,500,000
Of improvements thereon	$235,201	Railroads, steam — assessed value	$3,457,579
Of city and town lots	$1,115,120	Electric power plants—1; assessed value	$28,475
Of improvements thereon	$425,155	Electric lines, telephone and telegraph — miles, 75; assessed value	$42,511
Of personal property	$1,149,900	Number of acres irrigated	181,545
Total value of all property	$7,161,382		
Expended on roads, last fiscal year	$15,775		
Number of miles of public roads	875		

STATISTICS OF IMPERIAL COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	1,275	1,915	$7,660
Barley	68,795	103,195	1,031,950
Oats	890	260	7,800
Rye	46,875	93,750	937,500
Corn	1,765	7,060	21,180
Total cereals	119,600	206,170	$2,006,090
Alfalfa hay	46,875	93,750	$937,500

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	115	425	540
Apricot	1,050	9,730	10,780
Cherry	90	205	295
Fig	1,034	1,380	2,414
Lemon	84	411	495
Nectarine	6	11	17
Olive	22	77	99
Orange	187	19,232	19,419
Peach	21	1,221	1,242
Pear	247	13,188	13,435
Plum	25	490	515
Prune	17	920	937
Quince	.....	.....	28
Other kinds	87	747	834
Total fruit trees.	2,985	48,037	51,050
Grapevines	108,080	11,347	119,427
Berries, acres	532	.....	532
Asparagus, acres	752	.....	752
Beets, acres	140	.....	140
Cotton, acres	1,500	.....	1,500
Cottonwood trees, number	112,487	.....	112,487
Eucalyptus trees, number	297,452	.....	297,452

Poultry and Eggs.

	Dozen.	Value.
Chickens	265	$795
Turkeys	248	2,480
Total value		$3,275

Power used for mills and manufactories in county—Steam, 3; electrical, 1; water, 1.

Dairy Industry.

	No.	Production.	Value.
Creameries	4	.....	$8,000
Skimming stations	10	.....	.....
Butter, pounds		1,584,250	316,850

Fruits, Vegetables, Etc.

	Total Production. Pounds.	Value.
Green—		
Cabbage	1,120,000	$14,000
Grapes	1,050,000	21,000
Onions	150,000	750
Irish potatoes	1,350,000	13,500
Tomatoes	50,000	3,750
Totals	3,720,000	$53,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	273	$5,460
Stock	4,192	41,920
Dairy cows—Graded	4,790	95,800
Thoroughbred—Angus	125	6,250
Calves	2,289	11,445
Swine	44,279	110,697
Horses—		
Thoroughbred	75	7,500
Standard-bred	1,525	76,250
Common	1,728	51,840
Colts	801	8,010
Jacks and jennies	15	1,500
Mules	1,064	53,200
Sheep	9,700	19,400
Lambs	2,079	2,079
Total stock all kinds	72,935	$491,351
Wool, pounds	175,780	$17,578

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 2,087*	.....	$4,000
Honey	250,000	12,500
Sorghum, cane, acres	300	.....

*Estimate.

Manufactories.

	No.	No. of Empl's.	Value of Product.
Brick	2	20	$750,000
Confectionery	10	50	5,000
Electrical supplies	1	.....	.....
Foundries and iron works	1	.....	.....
Planing mills	1	5	*1,000

*Estimate.

Manufactured Output.

	Quantity.
Brick	7,500,000

KERN COUNTY.

Kern County, lying in the southern end of the San Joaquin Valley, its easterly boundary extending on to the Mojave Desert over the extreme southerly end of the Sierra Nevada Mountains, is the second largest county in the State and probably has the most diversified resources of any.

At Randsburg, on the eastern border, is one of the largest gold mines on this coast, and the country around Randsburg has many smaller mines that are free-milling ore, which make them paying properties of people or corporations of small means.

Along the southern border where the line crosses the San Emidio Mountains are large deposits of iron ore and antimony, which are yet undeveloped, and along the western side of the county are the Sunset, Midway, and McKittrick oil fields, lying along the eastern base of the Coast Range Mountains, and which promise to yield untold wealth in their future production of oil.

In the northern part of the county, and surrounding the town of Delano, is a large body of good land which is now attracting considerable attention from investors, as development has shown that within a few feet of the surface lies an unlimited quantity of water, which can be raised to the surface to transform the arid plains into orchards and alfalfa fields.

In the northeastern part of the mining town of Kernville, surrounded by good mines, and near it on the south fork of the Kern River is the South Fork Valley, where numerous prosperous stockmen have their alfalfa fields that furnish feed to the stock that pasture in the high Sierras in the summer time.

In the center and surrounding the town of Bakersfield, the county seat, lie thousands of acres of fertile land that are irrigated by Kern River, and which are mostly used to raise stock and alfalfa, but will produce anything that can be raised where there is good land and an abundance of sunshine.

Quite a large amount of capital is being interested in the installation of pumping plants in the Weed Patch, which is a fertile tract of land lying at the base of the Coast Range and Sierra Nevada Mountains, and ranging in distance between eight and twenty miles from Bakersfield in a southeasterly direction and has heretofore been uncultivated on account of the scarcity of water.

A short distance north of Bakersfield lies the famous Kern River oil field, the production from which has amounted to many million barrels, and which will undoubtedly produce for a great many years to come.

In the Kern River and Sunset oil fields we have numerous refineries that are producing thousands of tons of asphalt that finds a ready market in all parts of the United States.

There are two transcontinental railroads passing through the county, with branch roads running to the McKittrick, Sunset, and Kern River oil fields.

The past year has been a valuable one in the history of the development of the county, both with reference to its agricultural lands and in connection with its mineral resources. Many homeseekers have been attracted here by reason of the cheapness of the land, and particularly is this true of the northern area where the small settler must depend upon pump irrigation. In Delano, McFarland, and Wasco sections many new families have made homes, and the lands to the southeast of Bakersfield are also attracting much attention, as are the mesa lands, also the foothills on both sides of the valley. One promising colony has been founded and others are contemplated.

Mention was made in this report last year of the activity in the direction of the colonization of lands throughout the county. The subdivision is still proceeding satisfactorily and the movement is growing. Six miles north of Bakersfield many thousands of acres of land have passed into the hands of prosperous German farmers from the Middle West, who are proceeding to develop a water supply of their own, and are converting the heretofore barren lands into productive farms. A vast deal of other dry lands in the county is being sold to small farmers, and the next year will see a great increase in the number of heads of families on such lands.

The territory within the proven thermal belt has attracted much attention, and land values are increasing rapidly. The entire area of mesa and foothill lands is practically proven orange lands, and many projects are under way for the planting of groves.

Increased price of oil has stimulated activity in this industry. On the west side of the valley the area of proven land is being extended steadily, and it has been demonstrated that the oil measures are continuous from Sunset to Templor and from the foothills to the Buena Vista Lake. The building of pipe lines into that territory by the Producers' Transportation Company and the Associated Company will give the producers three outlets for their product, the Standard having already constructed a pipe line into that field.

In the Kern River field production continues unabated in the proven territory, and some new land has been developed within the year.

Opportunities for labor are greater within the county than ever before. The oil fields are employing thousands of men, and the work on the aqueduct on the desert continues to furnish labor to several hundred people. Building in Bakersfield, both in the business and residential sections, was never so active as at present, and many artisans are seeking the county, attracted by the opportunities here.

STATISTICS OF KERN COUNTY, 1908-9.

General Statistics.		General Statistics—Continued.	
Area, 8,100 square miles, or 5,184,000 acres.		Number of miles of public roads	1,650
Number of farms	1,200	Road levy per $100, 1909	30c
Number of acres assessed	2,883,274	Value of county buildings	$267,000
Value of country real estate	$16,699,741	Irrigating ditches—miles, 209; cost	$447,095
Of improvements thereon	$5,116,735	Railroads, steam—miles, 515; assessed value	$6,052,068
Of city and town lots	$2,074,254	Railroads, electric—miles, 7½; assessed value	$58,500
Of improvements thereon	$2,598,996	Electric power plants—3; assessed value	$2,281,010
Of personal property	$11,642,368	Electric power lines—miles, 144½; assessed value	$473,820
Total value of all property	$44,184,163	Number of acres irrigated	140,000
Expended on roads, last fiscal year	$103,560		
Expended for bridges, last fiscal year	$15,000		

STATISTICS OF KERN COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	15,000	8,000	$280,000
Barley	20,000	12,000	360,000
Corn	.....	5,500	148,500
Total cereals.	35,000	25,500	$788,500
Alfalfa hay	.....	23,000	$276,000
Grain hay	.....	9,000	135,000
Total hay		32,000	$411,000

In figures given on hay no mention is made except that shipped.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	12,000	2,000	14,000
Apricot	25,000	.....	25,000
Cherry	1,000	.....	1,000
Fig	1,000	.....	1,000
Lemon	500	500	1,000
Nectarine	1,000	.....	1,000
Olive	5,000	.....	5,000
Orange	6,500	5,000	11,500
Peach	44,000	10,000	54,000
Pear	1,500	.....	1,500
Plum	6,000	.....	6,000
Prune	41,000	5,000	46,000
Quince	500	.....	500
Total fruit trees.	145,000	22,500	167,500
Almond	2,000	.....	2,000
Pecan	200	.....	200
Walnut	200	.....	200
Total nut trees.	2,400	.....	2,400
Grapevines, acres.	1,100	.....	1,100
Berries, acres	65	.....	65

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apricots	480,000	$4,800
Lemons, boxes	3,000	5,550
Oranges, boxes	13,500	25,000
Peaches	320,000	2,500
Total		$37,850

Dried—	Pounds.	Value.
Almonds	40,000	$3,600
Apples	160,000	12,800
Peaches	280,000	12,600
Prunes	1,080,000	27,000
Raisins	1,100,000	22,000
Totals	2,660,000	$78,000

Canned—	Cases.	Value.
Apricots	500	$1,575
Grapes	50	150
Pears	100	370
Peaches	500	1,750
Plums	100	300
Tomatoes	50	140
Totals	1,300	$4,285

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 8,000	.....	$24,000
Beeswax	2,500	650
Honey	192,000	8,240
Alfalfa seed	100,000	15,000

Dairy Industry.

	Production.	Value.
Butter, pounds	545,900	$168,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	25,000	$875,000
Stock	60,000	1,080,000
Dairy cows—graded	3,300	99,000
Thoroughbred—		
Holsteins	100	5,000
Jersey	150	7,500
Calves	10,000	100,000
Swine	10,000	110,000
Horses—Thoroughbred.	15	15,000
Common	8,000	600,000
Colts	1,000	40,000
Mules	1,500	150,000
Sheep	181,500	832,500
Lambs	90,000	180,000
Total stock	394,065	$4,094,000
Wool, pounds	2,100,000	$252,000

The above-mentioned beef cattle were mostly shipped out of the county, many of them having been shipped into the county for feeding purposes.

Poultry and Eggs.

	Dozen.	Value.
Chickens	4,000	$16,000
Ducks	75	450
Geese	40	400
Turkeys	300	7,500
Eggs	200,000	40,000
Total value		$64,350

Forest Products.

	Amount.	Value.
Sawmills, number	2	.....
Lumber, feet	650,000	$13,000

Area of timber land, 10,000 acres, not owned by the Government; mostly pine.

Fuel, wood, for local consumption only.

Two small mills supply the demand in mountain districts.

Manufactories.

	No.	No. of Empl's.	Value of Product.
Bookbinders	1	2	$3,000
Brick	1	40	28,760
Cigars	2	17	21,960
Confectionery	3	10	12,000
Flouring mills	1	16	116,065
Foundries and iron works		70	325,000
Lime	3	75	75,000
Meat products—			
Hides		.....	55,200
Tallow		.....	15,750
Soap		2	2,000

Soap factory began manufacturing in June.

Manufactured Output.

	Quantity.
Brick	4,395,000
Cigars	488,000
Flour, barrels	18,720
Lime, barrels	90,000
Hides, pounds	507,000
Tallow, pounds	318,000
Soap, pounds	24,000

KINGS COUNTY.

Kings County is located near the south end of the San Joaquin Valley and is level over nine tenths of the entire surface. Rivers: Kings, Cross Creek, Tule. Irrigation from all the streams, mainly from Kings River.

Railroads: Southern Pacific and Santa Fe.

Fruits, raisins, wine, stock, and dairying, poultry, hogs, all are raised in abundance.

One of the best dairy counties in the State. Alfalfa grows to perfection, also grapes.

The San Joaquin Light and Power Company has a line through the county from north to south. The Mount Whitney Power Company has entered the county from the east.

The Pacific Sugar Corporation has completed a factory at Corcoran at a cost of one million dollars. Sugar shows a factory test of 20 per cent, and yields from 10 to 20 tons per acre.

Artesian wells are found over the south half of the county at a depth of 200 to 2,000 feet. Irrigation from artesian wells and pumping is increasing very fast.

The mountains are in the southwestern part of the county.

Oils in paying quantities have been found and are being developed.

Vegetables, berries, small fruits of all kinds, are produced in abundance, and supply the local markets.

LAKE COUNTY.

By her sister counties, Lake has long been cheerfully accorded the title of "The Switzerland of America," owing to her beauty of scenery. The county is located in the heart of the Coast Range, about 100 miles north of San Francisco, and is about 75 miles long and 25 miles wide. Mount St. Helena guards the southern extremity. Clear Lake is a splendid sheet of fresh water 25 miles long and from 2 to 10 miles broad; with the lake surface at an elevation of 1,350 feet above sea level, and having a depth sufficient to float vessels of considerable tonnage and draft, receiving in its basin the waters from several streams of considerable flow. It is stocked with an amazing wealth of native food fishes and bordered by smiling valleys of great fertility, by orchards of luscious fruit, by gently swelling slopes, by ragged mountains, by wild canyons, touched with a certain savage beauty, and bearing upon its heaving breast a constantly increasing proportion of the internal commerce of the community. Clear Lake is the pride of Lake County, as well as the source of its name.

Although classed as mountainous, Lake County has a number of very fertile valleys, some of them being of large area. Artesian water is obtainable in profuse quantities, and with comparatively small outlay of money or effort. Fields are growing luxuriant crops of grain, though annually sown in the same crops for more than a half century. A variety of soils is found throughout the county, and even the valleys show differences. Generally, the valleys are rich with alluvium, but in places there are extensive tracts of adobe, black and heavy, and apparently inexhaustible in productiveness. Occasionally, a sandy loam is found in the valleys, especially in the neighborhood of the streams traversing the county at short intervals. On the plateau crowning the low foothills which ring the valleys is a lighter soil, and when cleared is capable of raising large vineyards and orchards of peaches, prunes, etc. The rocky hillsides furnish pasture for flocks of Angora goats.

Large bodies of sugar and yellow pine, fir, cedar, and oak give employment to several sawmills and furnish the home market a good quality of lumber.

The minerals have heretofore been represented by the quicksilver industry, although gold, silver, copper, and oil have been discovered in small quantities. Besides quicksilver, immense quantities of mineral water have been bottled at the many mineral springs and shipped to all parts of the country. The several mineral springs are the sites for as many health resorts, as many as thirty thousand guests being entertained from all parts of the country each summer. Some of them go to the resorts for their health, the bright, clear atmosphere being very beneficial, and the waters frequently having a highly curative property in certain complaints. Others seek the deer, the fishing, and other sports. Among the resorts are Bartlett, Highlands, Adams, Harbin, Zeigler, Witter, and Anderson Springs; Blue Lakes, Laurel Dell,

Hobergs, Soda Bay, Glenbrook, Carlsbad, Saratoga, Bonanza, Astorg, England, Howard, and Bynum.

There are several mines from which large amounts of quicksilver have been taken. Natural gas is found. There are large deposits of sulphur and of borax in some parts of the county.

STATISTICS OF LAKE COUNTY, 1908-9.

General Statistics.

Area, 1,332 square miles, or 852,480 acres.	
Number of farms	950
Number of acres assessed	361,485
Value of country real estate	$2,023,369
Of improvements thereon	$520,145
Of city and town lots	$283,060
Of improvements thereon	$287,990
Of personal property	506,881
Total value of all property	$3,624,990
Expended on roads, last fiscal year	$18,987
Expended for bridges, last fiscal year	$6,058
Number of miles of public roads	589
Road levy per $100, 1909	50c
Value of county buildings	$33,000
Irrigating ditches—miles, 10; cost	$3,000
Electric power plant—1; assessed value	$1,500
Electric power lines—miles, 3; assessed value	$250

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	26,245	1,050	27,295
Apricot	1,905	25	1,930
Cherry	565	65	630
Fig	270	20	290
Nectarine	175	.....	175
Olive	3,160	1,400	4,560
Orange	195	....	195
Peach	5,640	750	6,390
Pear	37,490	6,800	44,290
Plum	500	150	650
Prune	42,350	800	43,150
Quince	135	10	145
Total fruit trees.	118,630	11,070	129,700
Almond	5,250	50	5,300
Chestnut	7	.....	7
Walnut	1,310	800	2,110
Total nut trees.	6,567	850	7,417
Grapevines	437,640	60,600	498,240
Berries, acres	40	.....	40

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,415	$31,012
Stock	4,515	58,400
Dairy cows—Graded	765	21,075
Calves	1,175	7,250
Swine	7,780	56,380
Horses—		
Thoroughbred	6	7,500
Standard-bred	1	500
Common	2,050	111,200
Colts	358	13,925
Jacks and jennies	10	2,500
Mules	233	23,315
Sheep	8,875	26,650
Lambs	2,676	5,350
Angora goats	5,503	12,825
Total stock all kinds.	35,362	$377,882
Wool, pounds	62,500	$10,250
Mohair, pounds	16,490	4,200

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	2,553	1,142	$45,680
Barley	2,200	1,152	31,810
Oats	479	249	9,960
Corn	230	286	6,225
Total cereals.	5,462	2,829	$93,675
Alfalfa hay	2,181	5,324	$43,800
Grain hay	7,939	7,607	78,820
Grass hay	981	1,416	12,960
Total hay	11,101	14,347	$135,580

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	447,150	$7,320
Apricots	11,500	565
Blackberries	19,000	780
Beans	17,750	320
Beets	32,000	140
Cabbage	22,250	415
Celery	1,800	64
Cauliflower	900	45
Corn	47,000	790
Currants	400	40
Cherries	10,500	490
Figs	9,000	120
Gooseberries	1,500	90
Grapes	1,358,000	5,085
Loganberries	4,650	240
Nectarines	3,000	60
Onions	12,300	210
Pears	1,165,250	13,282
Peaches	40,500	1,090
Peas	7,500	300
Persimmons	1,000	50
Plums	25,500	250
Irish potatoes	1,080,000	14,095
Sweet potatoes	700	21
Quinces	5,100	86
Raspberries	2,500	250
Strawberries	23,540	1,880
Tomatoes	94,850	965
Totals	4,445,140	$49,043
Dried—	*Pounds.*	*Value.*
Almonds	39,150	$3,115
Apples	14,500	995
Beans	7,500	375
Onions	46,500	780
Pears	256,700	17,495
Prunes	966,000	18,400
Walnuts	11,500	1,265
Totals	1,341,850	$42,425
Canned—	*Cases.*	*Value.*
Beans	30,000	$60,000

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	23,000	$3,800
Sweet wines	1,100	275
Vinegar	5,700	1,375

Number of wineries, 18.

STATISTICS OF LAKE COUNTY, 1908-9—Continued.

Dairy Industry.

	No.	Production.	Value.
Creameries	4	82,910	$20,727
Butter, pounds		37,806	8,800
Cheese, pounds		72,000	10,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	5,800	$20,310
Ducks	46	220
Geese	24	198
Turkeys	476	11,965
Eggs	250,400	50,800
Total value		$82,773

Manufactories.

	No.	No. of Empl's.	Value of Product.
Cigars	1	2	$2,839
Flouring mills	3	6	46,480
Olive oil	1	1	400
Pickled olives	1	1	350
Planing mills	6	12	10,000
Mineral water	4	25	100,000

Forest Products.

	Amount.	Value.
Area of timber lands, acres	121,000	$750,000
Sawmills, number	10	22,500
Fuel, wood, cords	6,100	24,400
Lumber, feet	2,205,400	43,286
Posts, pieces	11,000	1,150
Shakes	70,000	700
Total value		$842,036

Power used for mills and manufactories in county—Steam, 21; water, 3; electrical, 1.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 270		$490
Honey	3,000	260
Hops	38,200	7,640
Alfalfa seed	220,600	27,475

Manufactured Output.

	Quantity.
Cigars	120,000
Lime, barrels	74,000

LASSEN COUNTY.

Lassen County lies in the northeastern part of California along the Nevada line. It is traversed from south to north by the Nevada-California-Oregon Railway (narrow gauge), which connects at Reno, Nevada, with the Southern Pacific system. The located line of the Western Pacific—in course of construction—runs through the southern portion of the county. Susanville, the county seat, is in Honey Lake Valley, a little south of the center of the county.

Lassen embraces large areas comprising rich valley lands, suited to agriculture, rolling hills and uplands, affording splendid range for stock; and mountain table-lands covered with timber.

The county has a population of only about 5,000. It could easily support many times that number. The assessment roll now foots over five and a half millions. The county has no debt, and the tax rate is only about $1.60 per $100 valuation. The people are generally well-to-do and prosperous. The bank at Susanville, with a capital of $50,000, has more than $300,000 on deposit, which shows a condition of easy finances.

The principal present industries are farming and stock raising. There are paying mines in the county, but as a whole Lassen is not mineral. Timber lands which are not in forest reserves are now generally held in private ownership, but as yet the manufacture of lumber has not been commenced. But farming and stock raising will always be the principal industries of the county. Climate and soil are particularly adapted to them.

The altitude of the largest, most fertile and most productive valleys, such as Honey Lake Valley, Big Valley, and Long Valley, is a little over 4,000 feet. Other large valleys, like Madeline Plains, Willow Creek Valley, and Secret Valley, are in the neighborhood of 5,000 feet above sea level. While the high valleys are not as well adapted to general farming as the lower ones, they are quite productive, and well suited to the stock raising business. The climate generally is similar to that of the northeastern states, so far as range of temperature is concerned, but our summer season is quite dry, making irrigation necessary as a rule. With irrigation, where the altitude is not too great, any of the ordinary products of the temperate zone can be produced in abundance and of fine quality. Apples, pears, cherries, peaches, apricots, and berries of all kinds do splendidly. Of farm products, alfalfa is probably the most important, though native grasses, timothy, and redtop are extensively raised.

Good hay and grass and pure cold water make the county an ideal one for dairying. There are a number of creameries in the county, and their product commands the top price in city markets.

Improved farm lands range in price from $25 to $100 or more per acre.

District schools are scattered all over the county. A county high school is located at Susanville. There are quite a number of churches in the county, including Methodist, Baptist, Catholic, and others. Three weekly newspapers are published—the Lassen Advocate and Lassen Weekly Mail at Susanville, and the Big Valley Gazette at Bieber.

Susanville is the largest town, with a population of about 1,000. It has a good and abundant water supply and good facilities for fighting fire. Its stores are well stocked, and goods are sold at reasonable prices. Business buildings, as a rule, are substantial, and residences handsome.

Lassen County has a range of temperature wide enough to give a pleasing variety to the seasons. Health conditions are fine. Pulmonary diseases are very rare, and malaria almost unknown. There are still large quantities of land open for entry, which, with water for irrigation, will make good farms and homes. There is plenty of water to irrigate these lands, and by the time this report is published the Western Pacific Railroad will be running trains through the southern end of the county.

STATISTICS OF LASSEN COUNTY, 1908-9.

General Statistics.

Area, 4,690 square miles, or 3,001,105 acres.	
Number of farms	700
Number of acres assessed	723,615
Value of country real estate	$3,910,746
Of improvements thereon	$446,844
Of city and town lots	$91,293
Of improvements thereon	$212,147
Of personal property	$1,155,706
Total value of all property	$5,862,156
Expended on roads and bridges last fiscal year	$30,000
Number of miles of public roads	1,000
Road levy per $100, 1909	60c
Value of county buildings	$47,000
Irrigating ditches, miles	125
Railroads, steam, miles	128.44
Electric power plants, number	2
Number of acres irrigated	27,000

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	15,000	$300
Asparagus	100	10
Blackberries	2,000	150
Beans	1,000	40
Beets	25,000	500
Cabbage	75,000	1,500
Celery	100	14
Cauliflower	1,200	24
Corn	20,000	400
Currants	2,500	50
Cherries	1,000	75
Gooseberries	800	20
Grapes	500	20
Loganberries	100	10
Onions	20,000	800
Pears	5,000	100
Peaches	20,000	600
Plums	5,000	50
Irish potatoes	6,600,000	99,000
Sweet potatoes	100	5
Prunes	1,000	20
Quinces	100	1
Raspberries	6,000	450
Strawberries	1,000	100
Tomatoes	20,000	500
Totals	6,819,500	$104,739

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	12,000	9,000	$270,000
Barley	3,000	1,600	64,000
Oats	3,500	2,000	80,000
Rye	1,500	600	24,000
Corn	50	.....	1,000
Total cereals	20,050	13,200	$439,000
Alfalfa hay	15,000	60,000	$300,000
Grain hay	1,000	3,000	15,000
Grass hay	90,000	180,000	720,000
Total hay	106,000	243,000	$1,035,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	15,000	7,000	22,000
Apricot	250	250	500
Cherry	500	200	700
Fig	.....	175	175
Nectarine	150	75	225
Peach	2,000	1,000	3,000
Pear	500	400	900
Plum	800	400	1,200
Prune	500	350	850
Quince	10	20	30
Total fruit trees	19,710	9,870	29,580
Walnut	100	50	150
Grapevines	200	100	300
Raspberries, acres	10	5	15
Blackberries, acres	10	10	20
Strawberries, acres	7	5	12
Gooseberries, acres	5	3	8
Loganberries, acr's	2	4	6
Dewberries, acres	1	2	3
Currants, acres	3	3	6

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	1,200	$7,200
Ducks	15	180
Geese	10	240
Turkeys	500	1,500
Totals	1,725	$9,120

STATISTICS OF LASSEN COUNTY, 1908-9—Continued.

Forest Products.

	Amount.	Value.
Area of timber lands, acres	240,000	$2,500,000
Sawmills, number	10	30,000
Lumber, feet	4,500,000	60,000
Posts, pieces	12,000	960
Railroad ties, pieces	150,000	.....
Sash and door factory, number	1	.....
Shakes, thousand	30	.....
Shingles, thousand	2,000	.....

Power used for mills and manufactories in county—Steam, 16; water, 3; electrical, 1.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	10,000	$350,000
Stock	30,000	600,000
Dairy cows—Graded	112	5,000
Calves	10,000	50,000
Swine	2,000	10,000
Horses—		
Thoroughbred	16	48,000
Standard-bred	70	21,000
Common	7,500	750,000
Colts	1,400	10,000
Jacks and jennies	75	15,000
Mules	300	30,000
Sheep	31,000	93,000
Lambs	25,000	50,000
Angora goats	500	2,000
Common goats	500	1,500
Total stock all kinds	118,573	$2,035,500
Wool, pounds	30,000	.....

Wines, Brandies, Etc.

	Gallons.	Value.
Beer, barrels	500	.....
Cider	130	$32

Number of breweries, 1.

Dairy Industry.

	No.	Production.	Value.
Creameries	4	.....	.....
Butter, pounds		400,000	$120,000
Cheese, pounds		75,000	.....

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 750	.....	$750
Honey, gallons	1,500	1,500
Alfalfa seed	300,000	36,000

Manufactories.

	Number.	Employees.
Wood boxes	2	12
Confectionery	1	2
Flouring mills	3	8
Jewelry	2	2
Leather goods	2	3
Planing mills	4	20
Wood turning and carving	2	10

Manufactured Output.

	Quantity.
Flour, barrels	8,000

LOS ANGELES COUNTY.

In wealth, population, and resources Los Angeles is the most important county in southern California. There are two rivers in the county, the Los Angeles and the San Gabriel. During a large part of the year these are dry beds of sand, what little water they contain finding its way through the porous sand to the bedrock. In the winter they are dangerous streams. The Los Angeles River rises in the western part of the San Fernando Valley, about 12 miles northwest of the city, and flows easterly 18 miles to the Los Angeles Pass. Its stream is fed all along by springs. Two other "rivers," the Pacoima and the Tejunga, join it in the San Fernando Valley. Turning south, it flows through the Los Angeles Pass, and on through the city.

Los Angeles County embraces within its limits a great variety of scenery and climate. Within its territory may be found the climate and scenery of almost every part of the State, from the cool and breezy seashore to the warm inland plains and bracing mountain tops. Of the area of the county, about four fifths is capable of cultivation, the remainder being mountainous. The shore line is 85 miles in length. Nine tenths of the population is within thirty miles of the ocean.

The marvelous growth which has been made during the past few years may be seen from the statement that, within the space of twenty-four years, the population of the county has increased more than tenfold, and the assessed valuation of property in proportion.

The chief industry is horticulture, the list of products including everything that can be grown in the State, and most everything that can be raised in semi-tropic countries. The area of land devoted to horticultural purposes is being rapidly extended as the large tracts are subdivided and improved.

The county is well provided with transportation facilities. A dozen lines of railroad center in Los Angeles City, tapping almost every section of the county, while coast steamships call regularly at the leading seaports.

Perhaps the most important enterprise for Los Angeles is the big breakwater by the Federal Government at San Pedro. By means of this breakwater the depth of water over the bar will be so increased as to permit ocean-going vessels to come to the wharves, and Los Angeles will then be able to compete for its share of the growing Oriental trade. Other shipping points of the county are Port Los Angeles, near Santa Monica, and Redondo.

The San Gabriel Valley, a choice section of Los Angeles County, has the Sierra Madre Range on the north. The mountains are grand and precipitous, inclosing the valley like a wall. This valley is the best known of any portion of southern California. Even before there was any "boom" here worthy of mention, lands in the valley commanded a comparatively high price. As with most attractive sections, the level-

headed mission fathers discovered its advantages, and founded the San Gabriel Mission—whose church is still in good preservation—in 1771. Now railroads traverse the valley, and the land is rapidly being transformed into a succession of small homes and thriving little cities. The valley contains 100 square miles of territory. The San Gabriel contains some of the choicest fruit lands in southern California, and is largely devoted to the raising of oranges and lemons, as well as deciduous fruits.

Pasadena, a beautiful city, is located at the foot of the Sierra Madre Range, about seven miles from Los Angeles. Within twenty years Pasadena has grown from a sheep pasture to a city of beautiful homes, with a world-wide reputation. Other settlements in the valley are Alhambra, Monrovia, Duarte, and Azusa, all of which are mainly supported by horticulture.

Adjoining San Gabriel Valley on the east is Pomona Valley. Irrigation is cheaply supplied to this section from the San Antonio River. The soil and climate are particularly adapted to the culture of citrus fruits. Railroad facilities are very good, and increasing, which has caused the valley to settle up rapidly. It contains a number of flourishing towns, the chief of which is Pomona, one of the most thriving cities of southern California. For miles in every direction around Pomona extend continuous orchards of oranges, lemons, apricots, peaches, prunes, olives, and other fruit trees, a specialty being made of olive culture.

Other important sections of the county are Los Nietos Valley, a well-watered district, noted for corn, alfalfa, and dairy products; the stretch of country between Los Angeles City and the ocean; San Fernando Valley, north of Los Angeles, in which a large amount of fine wheat is raised; and Antelope Valley, an elevated region in the northern part of the county, where land is cheap and, with water, very productive.

Los Angeles enjoys railroad competition in the shape of three transcontinental lines. The Pacific Coast Steamship Company runs vessels every few days from Los Angeles County ports to San Francisco and San Diego.

There is a great variety of soil in Los Angeles County, varying from light sandy loam to heavy adobe.

A mistaken idea prevails to some extent that farming is only carried on in Los Angeles County by means of irrigation, and that without it crops would be a failure. For grain and winter crops irrigation is not employed. Corn is irrigated in some localities, being a summer crop, but is successfully grown in many places without irrigation. Upon some lands, after a crop raised without irrigation has been harvested, another is raised by means of irrigation. On irrigated land two or three crops a year are frequently raised. With an artificial supply of water, the farmer is rendered independent of the season's rain, while the product of his lands is enormously increased.

The development of the horticultural industry during the past few years has been remarkable. The most important horticultural product is the orange. Besides the orange and lemon, the principal fruits raised are the almond, fig, prune, apricot, walnut, peach, pear, and berries.

Deciduous fruits are shipped fresh, canned, dried, and crystallized. An active demand for our dried fruits has grown up in Europe.

Alfalfa, which is largely grown for hay, is a most remarkable forage plant. It is cut from three to six times a year. Large quantities of wheat and barley are raised. Corn sometimes grows to a height of twenty feet. Pumpkins have been raised weighing over 400 pounds. There is a beet sugar factory at Alamitos. Los Angeles honey is celebrated all over the country. In the neighbornood of Los Angeles calla lilies, tuberoses, carnations, and other flowers are grown by the acre. Hundreds of acres are devoted to the cultivation of the celery, which is shipped East by the train load. Winter vegetables, such as string beans, tomatoes, green peas, and chili peppers, constitute a big business.

Until only a few years ago, most of the butter consumed in southern California was imported from the North and East. This is no longer the case, a number of creameries having been established during the past few years, with most successful results.

Poultry does well in Los Angeles County when it is given the same attention it receives in the East. Eggs always command a good price.

Ostriches are raised for their plumes, and the industry is profitable. There is a large ostrich form at South Pasadena.

Among the game found in the country are wild geese, ducks, snipe, rabbits, squirrels, foxes, deer, wildcats, California lions, and bear, the latter being found in the northern part of the county.

The angler finds plenty of trout in the mountain canyons. In the ocean there is excellent fishing, both with line and seine, and some remarkable catches are made. The yellowtail, ranging from 15 to 80 pounds, is very numerous in the waters of the Pacific. The tuna attains a length of five feet or more, and a weight of from 100 pounds upward. "Jewfish" are sometimes caught weighing 400 pounds.

Although Los Angeles County is chiefly noted as a horticultural section, its mineral wealth is by no means unimportant. Including petroleum, it ranks fourth in mineral products among the counties, and is the only one which leads in five mineral products. Los Angeles is the center of a number of rich mineral fields in southern California which annually produce many millions of dollars.

One of the most remarkable features of development in Los Angeles County has been the greatly increased production of petroleum. For over twenty-five years petroleum has been produced on a limited scale in Los Angeles and Ventura counties, but it is only within the past few years that the industry has assumed great importance. The oil produced in California differs from that of the Eastern States, being of a heavier grade, with an asphaltum base, and it is used almost exclusively for fuel. It has been adopted by most of the leading factories of this section, and is used largely by the railroads. A careful test made with a locomotive showed that oil at $1 a barrel is equivalent to coal at $4 a ton.

The school facilities of Los Angeles are especially good. Besides the complete system of public schools, private schools and colleges abound in Los Angeles, Pasadena, and other towns. Many Eastern people avail themselves of the opportunity to send children with a tendency to weak lungs to a country where plenty of out-of-door exercise is a possibility every day in the year. Most of the leading religious denominations are represented, not only by scores of churches, but also by one or more religious colleges. The work of the schools is further supplemented by

an army of specialists in music, painting, and every department of art. The Chautauqua has an active membership of nearly a thousand, and meets annually at Long Beach. Lectures and other entertainments, by home and foreign talent, are of almost daily occurrence. The educational and social facilities afforded by Los Angeles are, in the widest sense of the word, unsurpassed. Public libraries are numerous and well stocked with the latest works.

Catalina Island is a most attractive and popular resort in the Pacific, just off the coast of Los Angeles County. Between this resort and Los Angeles City there is a most excellent rail and boat service.

STATISTICS OF LOS ANGELES COUNTY, 1908-9.

General Statistics.

Area, 3,880 square miles, or 2,483,200 acres.	
Number of farms	9,148
Number of acres assessed	963,804
Value of country real estate	$60,873,687
Of improvements thereon	$15,228,660
Of city and town lots	$272,068,622
Of improvements thereon	$134,400,385
Of personal property	$103,845,171
Total value of all property	$568,416,531
Expended on roads, last fiscal year	$389,500
Expended for bridges, last fiscal year	$40,075
Number of miles of public roads	4,214
Road levy per $100, 1909	55c
Value of county buildings	$2,008,823
Irrigating ditches—miles, 245; cost	$350,000
Railroads, steam—miles, 684.718; assessed value	$15,815,087
Railroads, electric—miles, 951; assessed value	$36,308,674
Electric power plants—19; assessed value	$14,958,132
Electric power lines—miles, 2,256; assessed value	$16,420,327
Number of acres irrigated	87,250

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	129,091	22,170	151,261
Apricot	156,228	18,972	175,200
Cherry	2,156	1,094	3,250
Fig	22,860	1,640	24,500
Lemon	475,500	97,138	572,638
Nectarine	2,750	125	2,875
Olive	287,251	28,273	315,524
Orange	2,018,274	216,424	2,234,698
Peach	204,319	4,106	208,425
Pear	60,586	425	61,011
Plum	50,500	500	51,000
Prune	54,075	500	54,575
Quince	5,000	.....	5,000
Total fruit	3,468,590	391,367	3,859,957
Almond	146,650	.....	146,650
Pecan	1,200	.....	1,200
Walnut	264,547	32,817	297,364
Total nut	412,397	32,817	445,214
Grapevines	3,901,000	.....	3,901,000
Berries, acres.	3,557	.....	3,557

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	14	.....	.....
Skimming stations	6	.....	.....
Butter, pounds	.....	4,274,416	$2,282,325
Cheese, pounds	.....	1,406,118	250,125

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	2,847,189	$45,831
Apricots	4,218,330	84,387
Asparagus	10,000	1,600
Blackberries	975,000	58,500
Beans	1,281,250	32,933
Beets	250,000	1,600
Cabbage	5,850,000	58,500
Celery, dozen	90,000	18,000
Cauliflower	5,900,000	118,000
Corn, dozen	350,000	45,000
Cherries	16,000	800
Figs	600,000	17,500
Grapes	40,000,000	375,000
Grape fruit, boxes	22,000	45,000
Lemons, boxes	768,000	1,382,400
Loganberries	244,000	19,500
Nectarines	60,000	1,200
Onions	150,000	4,500
Oranges, boxes	2,000,000	2,800,000
Pears	750,000	18,500
Peaches	6,000,000	97,000
Peas	2,200,000	50,000
Persimmons	10,000	500
Plums	1,800,000	36,000
Irish potatoes	5,400,000	60,060
Sweet potatoes	1,800,000	40,000
Prunes	725,860	19,950
Quinces	25,000	2,150
Raspberries	95,000	9,275
Strawberries	9,750,000	380,000
Tomatoes	15,000,000	150,000
Total value		$5,972,280
Dried—	*Pounds.*	*Value*
Almonds	180,000	$21,500
Apricots	780,000	60,500
Beans	8,420,000	422,000
Onions	1,400,000	40,000
Peaches	612,000	5,500
Peanuts	7,500	500
Prunes	125,000	12,000
Raisins	600,000	20,000
Walnuts	8,746,426	1,122,817
Totals	20,871,202	$1,784,317
Canned—	*Cases.*	*Value.*
Apricots	12,500	$37,500
Beans	18,300	35,000
Corn	2,500	3,500
Pears	6,500	19,500
Peaches	10,000	25,000
Plums	6,500	19,500
Strawberries	30,000	90,000
Tomatoes	85,000	127,500
Chili, tons	1,500	75,000
Total value		$432,500

STATISTICS OF LOS ANGELES COUNTY, 1908-9—Continued.

Manufactories.

	No.	No. of Empl's.	Value of Product.
Bookbinderies	13	202	$385,375
Paper boxes	4	206	313,000
Wood boxes	3	89	202,000
Brick	13	835	844,000
Brooms	4	48	128,475
Carriages and wagons	19	517	1,144,610
Cement	1	30	40,000
Cigars	43	218	371,292
Clothing	19	580	936,817
Coffee, spices, etc.	10	101	906,000
Confectionery	27	485	1,117,878
Cooper-shops	2	28	72,250
Crackers	3	201	481,000
Electrical supplies	7	348	565,000
Flouring mills	7	221	3,323,055
Foundries and iron works	31	1,706	4,857,842
Furniture	25	352	590,708
Jewelry	10	94	292,109
Leather goods	12	120	343,172
Lime	1	30	19,000
Machinery	33	592	826,058
Malt*	3	....	200,000
Meat products—			
Hides	5	733	485,007
Lard	..	....	482,312
Meat packed	..	....	2,413,340
Tallow	..	....	114,922
Olive oil	5	72	280,000
Paper	2	36	190,000
Pickles	7	170	440,200
Pickled olives	4	90	461,240
Iron pipe	5	275	1,050,000
Sewer pipe	3	160	364,325
Planing mills	42	1,730	4,063,548
Potteries	7	125	250,000
Salt	3	68	98,000
Soap	5	85	428,600
Artificial stone	4	48	85,000
Granite and marble	12	44	1,126,475
Syrups and extracts	10	84	242,682
Tanneries	2	30	250,000
Tiling	1	50	50,000
Tin and galvanized iron	39	248	604,049
Willow and wooden ware	2	102	103,500
Wood turning and carving	3	10	25,800
Miscellaneous	82	2,072	3,262,606

*In case with beer.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	3,560	$106,800
Stock	15,216	456,480
Dairy cows—Graded	28,120	1,406,000
Thoroughbred—		
Guernsey	50	5,000
Herefords	50	5,000
Holsteins	500	50,000
Jersey	300	30,000
Calves	10,000	120,000
Swine	11,960	158,470
Horses—		
Thoroughbred	2,055	511,000
Standard-bred and common	28,000	1,960,000
Jacks and jennies	500	50,000
Mules	3,103	200,180
Sheep	40,000	200,000
Lambs	17,250	40,000
Angora goats	536	5,360
Common goats	3,000	15,000
Total stock all kinds	170,700	$5,404,290
Wool, pounds	310,000	$40,925

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	29,115	17,469	$524,070
Barley	63,730	27,442	636,050
Corn	14,100	12,690	318,000
Total cereals	106,945	57,601	$1,478,120
Alfalfa hay	19,836	99,180	$797,240
Grain hay	119,235	150,870	1,659,570
Total hay	139,071	250,050	$2,456,810

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	1,437,000	$287,000
Sweet wines	1,338,000	348,280
Beer, barrels	208,408	1,288,918
Brandy	34,800	17,400
Vinegar	21,000	2,100

Number of wineries and distilleries, 60; breweries, 4.

Fish Industry.

	Pounds.	Value.
Salmon	6,285,928	$314,296

Poultry and Eggs.

	Dozen.	Value.
Chickens	38,750	$232,500
Ducks	3,400	20,400
Geese	500	4,000
Turkeys	5,000	125,000
Eggs	3,560,320	890,080
Total value		$1,271,980

Forest Products.

	Amount.	Value.
Area of timber lands, cedar, oak, pine, mesquite, and redwood, acres	*587,520	.....
Fuel, wood, cords	6,000	$48,000

*In forest reserve.

Power used for mills and manufactories in county—Steam, 171; electrical, 260.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 5,400	.....	$162,000
Beeswax	33,000	8,250
Flowers and plants, acres	600	45,000
Honey	850,000	50,000
Alfalfa seed	10,000	1,000
Sugar beets, tons	90,400	542,400
Petroleum, barrels	4,359,672	2,833,787

Manufactured Output.

	Quantity.
Brick, thousand	120,980
Brooms, dozen	43,908
Cement plaster, tons	10,800
Cigars, thousand	8,420
Crackers, pounds	4,500,000
Flour, barrels	707,047
Lime, barrels	31,600
Malt, tons	50,000
Hides, pounds	4,467,941
Lard, pounds	4,801,020
Meat packed, pounds	29,562,520
Tallow, barrels	4,421
Olive oil, gallons	140,000
Paper, pounds	4,200,000
Pickles, gallons	880,800
Salt, tons	27,700
Soap, pounds	12,509,160

MADERA COUNTY.

Madera County is in the center of the San Joaquin Valley, bounded on the north by Merced and Mariposa counties, on the south, east, and west by Fresno County. The eastern portion of the county extends far up in the Sierra Nevada Mountains. From the foothills to the San Joaquin River, a distance of about 40 miles, the land is level and adapted to all kinds of agricultural pursuits. The melting snows of the mountains flow through numerous small creeks into the San Joaquin River, or serve to supply the farming section with water for irrigation. The higher mountains are heavily timbered with valuable wood, principally sugar and white pine. Lumbering, stock raising, quarrying, mining, fruit growing, and farming are the principal industries. There are two large wineries in the county. All kinds of fruits yield heavily on the irrigated lands. Minerals are iron, copper, gold, and silver. The power plant of the San Joaquin Light and Power Company is near North Fork, this county.

The county seat is Madera, and the other towns of the county are Raymond, Grub Gulch, Berenda, North Fork, Sugar Pine, O'Neals, Gold, Coarse Gold, Fresno Flats, Minturn, and Knowles.

STATISTICS OF MADERA COUNTY, 1908-9.

General Statistics.

Area, 2,200 square miles, or 1,408,000 acres.	
Number of acres assessed	739,088
Value of country real estate	$5,034,643
Of improvements thereon	$552,035
Of city and town lots	$356,455
Of improvements thereon	$275,315
Of personal property	$1,397,850
Total value of all property	$7,616,298
Expended on roads, last fiscal year	$6,920
Expended for bridges, last fiscal year	$32,465
Number of miles of public roads	720
Road levy per $100, 1909	40c
Value of county buildings	$160,000
Irrigating ditches—miles, 130; cost	$45,000
Railroads, steam—miles, 77.4; assessed value	$115,320
Electric power plants—1; assessed value	$95,710
Number of acres irrigated—	
Canal	15,000
Pumping plants	2,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	120,000	10,125	$369,562
Barley	130,000	30,000	780,000
Oats	5,000	1,125	37,125
Total cereals	255,000	41,250	$1,186,687
Alfalfa hay	10,000	40,000	$360,000
Grain hay	4,000	6,000	72,000
Total hay	14,000	46,000	$432,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	10,000	.....	10,000
Apricot	25,000	.....	25,000
Fig	1,500	.....	1,500
Lemon	150	.....	150
Olive	6,500	2,500	9,000
Orange	600	1,000	1,600
Peach	66,800	35,000	101,800
Prune	1,000	.....	1,000
Quince	25	.....	25
Pomelo	10	.....	10
Total fruit trees	111,585	40,500	152,085
Almond	550	.....	550
Grapevines	5,760	2,875	8,635
Berries, acres	100	.....	100

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	10,000	$300,000
Stock	50,000	1,000,000
Dairy cows—graded	2,000	60,000
Thoroughbreds—		
Holsteins	1,000	50,000
Calves	10,000	60,000
Swine	5,000	15,000
Horses—Thoroughbreds	100	20,000
Common	5,200	416,000
Colts	950	23,750
Jacks and jennies	31	3,100
Mules	2,500	250,000
Sheep	10,000	30,000
Lambs	7,000	7,000
Common goats	200	600
Total stock all kinds	103,981	$2,235,450
Wool, pounds	100,000	$14,500

STATISTICS OF MADERA COUNTY, 1908-9—Continued.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	10,000	$30,000
Ducks	500	3,000
Turkeys	600	12,000
Total value		$45,000

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	75,000	
Cedar, acres	4,000	$1,875,000
Pine, acres	71,000	
Sawmills, number	3	1,200,000
Lumber, feet	35,000,000	1,500,000
Sash and door factories, number	1	60,000
Total value		$4,635,000

Power used for mills and manufactories in county—Steam, 4; water, 1; electrical, 1.

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives		$3,000
Honey	50,000	5,000

Dairy Industry.

	Value.
Butter, pounds 1,000,000	$250,000

Creameries, 1.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	480,000	$12,000
Blackberries	10,000	5,000
Olives	200,000	5,000
Totals	690,000	$22,000

Dried—	*Pounds.*	*Value.*
Almonds	8,000	$1,040
Apricots	250,000	18,750
Peaches	950,000	38,000
Raisins	2,400,000	60,000
Totals	3,608,000	$117,790

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	400,000	$80,000
Sweet wines	1,000,000	250,000
Brandy	40,000	80,000

Number of wineries, 2; distilleries, 2.

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Wood boxes	1	70	$100,000
Granite	2	475	1,000,000
Saw and planing mills	2	900	2,000,000
Sash and door		100	250,000

MARIN COUNTY.

Marin County is decidedly one of water frontage, being bounded on the west and south by the Pacific Ocean and by the Golden Gate, which separates it from San Francisco by only a mile and a half at its nearest point, and on the east by San Francisco Bay.

The topographical features are rolling hills and numerous small valleys. A part of the Coast Range crosses Marin in a northwesterly and southeasterly direction, and much of the surface of the county is broken and hilly, but a considerable portion immediately on the shore is composed of marsh and overflowed lands. The highest land is Mount Tamalpais, which has an elevation of 2,608 feet.

The soil varies from the rich adobe clay of the salt marshes to the sharp, gravelly loam of the higher foothills. In the valleys it is composed of heavy black loam with an admixture of gravel; in the foothills a reddish loam prevails, sharper, and carrying less adobe. It is all easily worked, heavily charged with the elemental constituents of plant life, admirably suited to horticultural purposes, and wherever worked to fruit yields heavily. Irrigation is not required. The depth of the soil, its retentive nature, and ample rainfall in winter, render artificial watering unnecessary.

Annual average rainfall at Point Reyes, 17.56; Point Bonita, 25.39; San Rafael, 39.58. Mean summer temperature of San Rafael, 76 degrees for June, July, August, and September; for the other months, 61 degrees.

The principal industry is dairying, but of late years attention has been paid to fruit growing. Some of the finest apples grown in the State are produced. On the dairy lands of the Novato ranch there are ten orchards. On every rented subdivision of this, and the Burdell ranch, are apple, pear, quince, fig, pomegranate, persimmon, apricot, peach, plum, and other fruit trees, the thrifty growth and large yield from which prove the superior adaptability of the soil and climate of this portion to fruit growing. On the Novato ranch is one of the largest fruit orchards, including one of the oldest and most celebrated apple orchards in the State.

The land is generally held in large tracts, and rented out for dairying purposes. As a result there is but a sparse population, and but little advance is made in horticulture, although the greater part of the county is eminently fited for this industry. The DeLong orchard was planted in 1857, and has been in continuous bearing from the beginning.

Immense amounts of vegetables are shipped from the lowlands.

The shipments of butter are enormous, and the quality is first class.

Most of the large ranches are stocked by the owners, and divided into tracts, which are leased at annual rentals, according to the number of cows.

San Rafael is the county seat. It has many fine buildings, public and private, elegant hotels, banks, fine churches, schools, electric lights, and a perfect sewerage system. It is a noted place of residence for San Francisco business men, and its hotels are a favorite resort for invalids and tourists. Its climate is regarded as very favorable for those with pulmonary complaints. Its private dwellings are elegant and its drives most beautiful and romantic. The road to the summit of Mount Tamalpais is a continuous and easy grade. San Rafael, in a sheltered valley, is secure from ocean fogs and winds. It is in constant communication with San Francisco by rail and ferry at Point Tiburon.

Sausalito is also a favorite place of residence for San Francisco business men, possessing features similar to San Rafael. Novato is the center of the fruit district; Point Reyes of the dairy interests.

At San Quentin is located one of the State prisons. It is situated on San Francisco Bay, about 12 miles north of San Francisco, with which it is connected by ferry.

MENDOCINO COUNTY.

Mendocino County has 100 miles of coast line. In general topography it is mountainous, with valleys lying between the mountain chains and along the coast. It, together with the counties of Humboldt and Trinity, embodies the greater part of the northern Coast Range Mountains, and contains their highest peaks and deepest canyons, fertile valleys, wooded slopes, rushing rivers, and picturesque scenery. It shares with Sonoma, Humboldt, and Del Norte the glory of the great redwood belt.

The county has a length of 85 miles from north to south, and the width is 45 miles from east to west. It is traversed the entire length by the Coast Range, which is composed of two parallel ridges. These mountains vary in height from 1,000 to 3,000 feet. Their lower slopes have a gentle declivity, while the higher portions are generally precipitous and furrowed with ravines and gulches. There are many small productive valleys throughout the county.

Mendocino is well watered with the numerous streams which take their rise in the mountain chain which intersects her territory. The Eel River, running north, and the Russian River, running south, have their sources in this county, and are the principal streams. A large number of tributaries connect with them, while down the slope of the western ridge large numbers of creeks, some of which might aspire to the dignity of rivers, find their way to the Pacific.

Almost the entire coast section is composed of valleys, in some places extending inland five miles, and the soil is very fertile and productive. The towns are all short distances apart, and most of the larger ones have large sawmills and are the shipping points for large quantities of lumber, ties, tanbark, etc.

In Ukiah Valley there is the greatest variety of soil, even on a small tract. All of the best lands are under cultivation. Holdings are not large, 200 acres of valley land being an exceptional farm, and the tendency is to subdivision.

The soil in Yorkville Valley is a rich, black loam, and well adapted to the growing of vegetables, fruits, grains, and hogs. The soil of the hillsides and mountains is well suited to the growing of grass, vines, and fruits, and in some places grain.

Anderson Valley is a long, narrow strip of land lying between two chains of mountains. It extends 17 miles southeast and northwest, and is from 1 to 2 miles in width. The soil in this valley is a rich alluvium, and is well adapted to the growing of vegetables, fruits, and cereals. The soil of the hills is a rich, black loam, except in a few places, where there is adobe and gravel.

In Potter Valley the soil is mostly a sedimentary deposit, but a variety exists—some clay, a small amount of adobe, and some lands well adapted to fruit raising.

In little Lake Valley the soil generally is a rich, sandy loam, but in a few places a black loam is found. The soil is very productive, and

never in the history of the valley has there been anything approaching a failure.

Wheat, barley, oats, and corn are the principal grains raised. Hops, beans, potatoes, and garden vegetables of various kinds are raised profitably in several localities. Fruits of widely varied nature are grown in gradually increasing quantities, oranges, lemons, figs, prunes, peaches, plums, apricots, apples, and pears being cultivated. The apples have been noted for their excellence for nearly twenty years. The Bartlett pears are eagerly sought by the canning companies. The planting of pear orchards has been encouraged of late years by the demonstration repeatedly given that this fruit tree is a reasonably certain bearer, and the returns are large. Strawberries, blackberries, and loganberries are cultivated increasingly, with good results.

There are extensive horse and cattle ranges. Dairying is a remunerative occupation, and with railroad facilities this line of production will be vastly increased. The making of cheese is followed with profit in Upper Lake.

Along the coast from Hardy south to Gualala there is a strip of farming and dairy land, varying in width from a half to 5 miles, and comprising as rich and productive soil as can be found anywhere. Around Manchester, Bridgeport, and Point Arena are located a number of creameries that stand at the head of the California list in competition. The principal agricultural industries are wool growing, dairying, poultry and stock raising, and the growing of hops, grain and other cereals, potatoes, apples, and fruits of almost all descriptions. Wine making is very thriving, and new vineyards are constantly coming into bearing.

Dairying is one of the leading interests. There are some up-to-date creameries, with numerous skimming stations. The butter produced is of a very high grade, and finds a ready market.

Stock raising, grazing, and wool growing are very much in evidence. There are about 1,000,000 acres of land specially adapted for grazing purposes. The shipments of wool, of a grade second to none, amount to about 1,000,000 pounds per annum.

The Angora goat thrives well, the mountains being an ideal pasture.

Hops are a very prolific crop and of the finest grade.

Crops of wheat, oats, and barley are always certain.

Potatoes and apples of a very fine quality are raised and bring remunerative prices. The apples excel in size and flavor.

The Bartlett pear, nectarine, peach, and fig are grown very successfully. Berries of all descriptions grow abundantly and are of large size and fine flavor.

No irrigation is required, and crops do not suffer from drought at any time.

In the county are large tracts of redwood, covering over 600,000 acres, the lumber cut from which amounts to 100,000,000 feet annually. The lumber mills, in addition to having their logs floated on the streams on which they are situated, have modern railroads extending into the heart of the redwood belt. The largest mill in the interior is at Willits. All employ a large number of persons in the woods, about the shipping points, on their railroads, and in their mills. Shingles, boxes, and other lumber products are manufactured and shipped in large quantities.

Ukiah, the county seat, is located on the California Northwestern Railroad.

Most of the trade is carried by vessels from coast points to San Francisco. The California Northwestern Railroad, connecting with San Francisco, runs 60 miles through the county from south to north.

All the streams abound in trout. Game—quail, grouse, pigeons, and deer—is abundant.

Land suitable for agricultural purposes, fruit growing, etc., can be obtained at reasonable prices.

The Snow Mountain Water and Power Company is now furnishing electric light and power from the waters of Eel River, brought through the mountains by tunnel into Potter Valley, and the line supplies both these valuable adjuncts to town and county south to San Francisco. With this power supplied at any point throughout the fertile Russian River Valley, intensive farming can be engaged in, and unique, effective, and cheap facilities for manufacturing may be had at any desirable location.

MERCED COUNTY.

Merced County possesses as good land as is to be found anywhere in the San Joaquin Valley for fruit and alfalfa, but its development has been retarded by large land holdings, and grain growing has been the principal occupation. Within recent years, however, thousands of acres have been subdivided into colony lots and placed on the market, and vigorous advertising campaigns organized. This, of course, means immigration, development, and prosperity.

The good roads movement is receiving its due amount of consideration in the county, and the different supervisorial districts have built several miles of new roads, with the expectation of extending them as fast as possible. The county is particularly fortunate in being able to secure a high grade of road material from the nearby rock crusher at Jasper, on the line of the Yosemite Valley Railroad, and at reasonable cost.

The new Yosemite Valley Railroad has its terminal facilities in the city of Merced, which include a general office building and depot, roundhouse, turntable, and switch yards. It is a standard gauge steam road. The line connects at Merced with the trunk lines of the Santa Fe and Southern Pacific, and extends to El Portal at the Yosemite National Park line, a distance of 78 miles. It is a picturesque route, following the course of the Merced River Canyon.

The road was built to handle the immense tourist travel to and from the celebrated Yosemite Valley, and Merced has become known as the gateway to Yosemite, on account of the thousands of tourists who pass through annually. Leaving the little city of Merced, the traveler is soon on the open plains, headed for the snow-capped Sierras that arise abruptly to the eastward. We get our first view of the beautiful Merced River and cross it just before reaching Hopeton. Another stretch of tangent track and a curve or two, and we round the outskirts of the old town of Snelling. This is the rich farming district of the Merced, as is shown by the herds of cattle and hogs, the orchards, the fields of alfalfa and Indian corn. The next stop is Merced Falls. Here we see a broad, smooth expanse of the river, and hear the roar as the water rolls over the falls.

On leaving this point we enter the Merced Canyon, and the ascent through the narrow gorge has commenced. We begin at once to notice the signs of the mining days of old, for the Merced was famous in that respect, and, for that matter, still has gold and other mineral along its course which is being actively mined. The Exchequer power plant and dam is the next mark of modern improvement and just beyond a short distance is Pleasant Valley, so named from its surroundings. A bend in the river is passed, and we again cross the river. Of the many interesting sights in the canyon, the several waterfalls or dams are sure to attract attention. Bagby may be called the halfway station, and this pretty little mountain retreat, with its broad sheet of water pouring over the dam, the stamp mill and the power plant, has some history that

takes us back to the early days when General Fremont erected here a stamp mill and christened it Benton Mill in honor of Senator Benton of Missouri. A wagon bridge also spans the river here on the old road that connects Coulterville and Mariposa.

We now begin to realize more fully that we are penetrating deeper and deeper into the mountains, for the canyon walls shut us in completely and tower skyward, and we see nothing but huge mountain walls ahead and behind us. The track curves about each projecting abutment with the exact precision of the river. The water rushes over great bowlders and forms into many rapids and cataracts. Along here we see the mouth of the North and South Fork tributaries empty their rushing torrents from the distant snow-capped mountains and lakes and wonder at the awful chasms whence they issue.

We round another curve, completing almost a full circle of what is known as the "Hogback," when plainly up the canyon ahead of us, on the face of the mountain wall, we see the filmy sheet of water called the Chinquapin Fall, and opposite which and far below on the river's edge is El Portal, the end of the first part of the journey, and the commencement of the exciting and romantic stage ride of fourteen miles through the Yosemite Park. Away up in the mountains, an altitude of nearly two thousand feet, we find this picturesque, secluded resort, a fine large hotel with wide verandas, shut in on all sides by the mountains, with the wild rushing river before us. Here we may stop for rest and enjoyment, and proceed to Yosemite when we are ready to do so.

The stage ride through the Yosemite Park from El Portal is one of the principal features of the entire trip, for its beauty and grandeur are unsurpassed by any other road of equal length in America. The road continues along the ever-present river to the Portal of Yosemite, and the traveler is in a measure prepared for the sublimities of California's Wonderland, which burst on the view as the stages halt on the bank of the river for the first general view of the valley, where El Capitan rises abruptly three thousand three hundred feet high, the mighty guardian of the valley, with the beautiful Bridal Veil Fall to the right with its nine hundred and forty feet of mist and rainbow effect. Ere we reach our hotel or camp, we have received our first general impression of the great valley. Its beauty and grandeur grows upon you. It is indescribable; it must be seen to be appreciated.

The creamery industry has developed so rapidly that Merced County is now near the head of the list in the production of cream.

Merced County excels in the quantity and quality of its sweet potatoes. The fig industry is yet in its infancy, but it has been proven that the soil and climatic conditions are very favorable, for the Government expert has pronounced this soil best for figs and olives. Also the peaches and grapes of Merced County have a State reputation.

The flour mills are producing an extra good quality of flour, so are rapidly increasing their outputs.

Merced County is located about the center of the State and also about the center of the San Joaquin Valley. Numerous rivers and creeks traverse the county, furnishing a natural water supply, while the county's system of artificial irrigation is one of the finest in the world. It has two systems, one on the east side and the other on the west side of the San Joaquin River. The main canal on the east side is 65 feet

wide at the bottom and 100 feet wide on top and 10 feet deep, the carrying capacity being 4,000 cubic feet per second. The length of the canal is about 50 miles, with something over 250 miles of subsidiary canals built as a part of the system, and these are constantly being added to as the demands require.

The canal on the west side is 40 miles in length with over 100 miles of lateral ditches, literally making an otherwise dry section "blossom as a rose." Lake Yosemite, the reservoir into which the canal empties, covers about a square mile, with the average depth of 36 feet.

STATISTICS OF MERCED COUNTY, 1908-9.

General Statistics.

Area, 2,000 square miles, or 1,280,000 acres.	
Number of farms	2,750
Number of acres assessed	1,164,785
Value of country real estate	$10,943,583
Of improvements thereon	$1,062,399
Of city and town lots	$626,798
Of improvements thereon	$925,558
Of personal property	$2,689,913
Total value of all property	$16,248,251
Expended on roads and bridges, last fiscal year	$77,441
Number of miles of public roads	1,050
Road levy per $100, 1909	55c
Value of county buildings	$196,250
Irrigating ditches—miles, 219; cost	$336,193
Railroads, steam—miles, 154.12; assessed value	$3,432,408
Electric power plants—1; assessed value	$43,100
Electric power lines—miles, 18½; assessed value	$4,162
Number of acres irrigated	160,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	7,299	2,556	$92,016
Barley	86,825	33,140	828,500
Oats	16,012	3,218	96,540
Rye	5,000	75	2,400
Corn	3,200	1,500	45,000
Total cereals	118,336	40,489	$1,064,456
Alfalfa hay	22,375	35,350	$282,800
Grain hay	26,000	19,000	190,000
Total hay	48,375	54,350	$472,800

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	5,103	$227,595
Stock	36,352	436,229
Dairy cows—Graded	19,875	796,875
Thoroughbred	212	10,550
Calves	7,412	51,885
Swine	35,150	281,200
Horses—Thoroughbreds	35	10,500
Standard-bred	3,860	386,000
Common	1,500	90,000
Colts	1,242	25,850
Jacks and jennies	115	11,500
Mules	2,268	340,200
Sheep	67,042	201,126
Lambs	28,734	57,468
Angora goats	3,800	9,500
Common goats	2,960	5,920
Total stock all kinds	215,660	$2,942,398
Wool, pounds	536,336	$69,722

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	40,125	$600
Apricots	75,000	750
Asparagus	4,800	240
Blackberries	125,350	6,267
Beans	275,250	9,632
Beets	52,000	520
Cabbage	79,650	796
Celery	10,250	204
Cauliflower	63,275	1,265
Corn	175,230	3,504
Cantaloupes, crates	35,750	2,500
Figs	75,250	752
Grapes	4,942,700	27,544
Grape fruit	1,100	55
Lemons, boxes	1,310	2,620
Loganberries	135,270	5,410
Nectarines	6,125	61
Onions	21,250	424
Oranges, boxes	2,635	3,935
Olives	125,160	2,502
Pears	85,350	853
Peaches	1,533,712	15,337
Peas	31,250	624
Persimmons	1,500	60
Plums	81,125	811
Irish potatoes	501,250	5,012
Sweet potatoes	13,000,000	162,500
Pumpkins	4,000,000	6,000
Quinces	21,265	318
Raspberries	5,125	306
Strawberries	31,250	1,872
Tomatoes	102,800	514
In boxes	1,249,000	23,600
Watermelons	1,428,000	5,000
Total		$292,388

Dried—	*Pounds.*	*Value.*
Almonds	81,810	$11,200
Apricots	131,545	9,208
Beans	180,250	12,614
Figs	488,700	19,520
Onions	115,000	1,710
Pears	1,500	105
Peaches	465,960	25,600
Peanuts	3,500	280
Prunes	100,000	3,000
Raisins	45,000	135
Walnuts	8,000	1,000
Pecans	600	66
Totals	1,521,865	$84,438

Canned—	*Cases.*	*Value.*
Figs	150	$600
Peaches	10,000	27,500
Plums	1,200	3,300
Sweet potatoes	3,200	6,400
Totals	14,500	$37,800

STATISTICS OF MERCED COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	5,250	2,278	7,528
Apricot	7,200	8,936	16,136
Cherry	512	2,130	2,642
Fig	7,800	8,250	16,050
Lemon	750	350	1,100
Nectarine	608	50	658
Olive	3,823	3,260	7,088
Orange	2,568	5,150	7,718
Peach	101,778	375,164	476,942
Pear	3,565	8,571	12,136
Plum	246	107	353
Prune	9,217	2,130	11,347
Quince	350	150	500
Other kinds	50	100	150
Total fruit trees.	143,717	416,626	560,343
Almond	20,645	10,747	31,392
Chestnut	25	.....	25
Pecan	50	.....	50
Walnut	900	875	1,775
Other nuts	5	.....	5
Total nut trees.	21,625	11,622	33,247
Blackberries, acres	35	30	65
Mammoth, acres.	15	5	20
Dewberries, acres.	5	2	7
Loganberries, acres	30	10	40
Strawberries, acres	15	5	20
Raspberries, acres.	2	1	3

Grapevines, all kinds, bearing, 1,303,500; non-bearing, 1,178,100; total, 2,481,600.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines, claret	59,300	$8,775
Sweet wines, port	86,000	21,220
Brandy	21,000	21,000
Vinegar	1,500	300

Number of wineries, 1; distilleries, 1.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 2,300	.....	$4,600
Beeswax	200	54
Broomcorn	6,000	195
Honey	125,640	12,564

Poultry and Eggs.

	Dozen.	Value.
Chickens	5,500	$33,000
Ducks	200	1,200
Geese	42	504
Turkeys	1,840	55,200
Eggs	275,000	68,750
Total value		$158,654

Dairy Industry.

	Production.	Value.
Butter, pounds	270,000	$81,000

Creameries, 3; skimming stations, 6; gallons, 6,636,746; value, $1,991,023.

Forest Products.

	Amount.	Value.
Fuel, wood, cords	604	$3,624

Power used for mills and manufactories in county—Steam, 1; water 1; electrical, 1.

Manufactories.

	No.	No. of Empl's.	Value of Product.
Brick	2	.....	$10,000
Flouring mills	2	.....	90,000
Meat products—			
Hides		.....	42,500
Lard		.....	10,500
Tallow		.....	3,125
Olive oil		.....	2,000
Pickles		.....	2,567
Cereals		.....	12,000
Macaroni		.....	8,000

Manufactured Output.

	Quantity.
Brick	1,250,000
Flour, barrels	16,000
Hides, pounds	425,000
Lard, pounds	70,000
Tallow, barrels	250
Olive oil, gallons	1,000
Pickles, olives, gallons	3,425
Cereals, pounds	400,000
Macaroni, pounds	30,000

MODOC COUNTY.

Modoc County lies in the extreme northeastern corner of California. The county is a succession of mountain ranges and valleys branching off from the Sierra Nevada Mountains, the principal spur of which is the Warner Range. It is principally drained by Pitt River, which flows into the Sacramento, near Redding, Shasta County. The lava-bed section occupies over one half the total area. The county has two large lakes, but barring the lakes and the large cattle ranges it is sparsely settled.

The valleys are the principal features, the leading ones being Surprise, Goose Lake, Hot Springs, Jess, Big, and Little Hot Springs.

Wheat, barley, fruit, vegetables, and hay are the leading staples. Thousands of acres are in alfalfa, and the stock and dairying industries are thriving. Every ranch has a fine orchard, and ranch houses and barns, costing $5,000 or $6,000 in total improvements, are not uncommon. Trees, both shade and ornamental, abound around every place.

The climate is that of the temperate zone, and the products are those of the great intermountain region which stretches from the Sierra to the western plains of Kansas. Snow falls in the valleys and much deeper in the mountains, forming the principal supply of moisture for the development of the country. Stock is usually fed for several months through the winter, although it is not always necessary to do so. The thermometer will sometimes run below zero for a few days in the winter, but not for very long, and 90 degrees is extreme heat for summer. Even in summer the evenings are cool and delightful.

The county is well watered. Surprise Valley has nearly twenty streams, which run both winter and summer. Goose Lake Valley is equally fortunate, while Pitt River supplies water for many farms and ranches. Many springs exist, especially in the mountains; and in Surprise Valley there are many artesian wells.

The timber of the county is pine and fir in the Warner Range, and sugar pine in the western part.

Horticulture has had but a small place in the industries, only sufficient fruit for home uses being raised. However, the gradual approach of the railroad running north from Reno, Nevada, will increase the productivity in this line immensely, as the county is well adapted to apples, pears, and berries. The wild plum is about the only native fruit. The cultivated fruits were brought in the earlier days from Eastern States by the immigrants who came across the plains. A great deal of orchard planting has been done within the last few years.

The last five years has seen a great deal of reservoir work undertaken throughout the county and its tributary valleys. The rains come in time to insure abundant harvests year after year.

The nearest railroad point to Alturas, the county seat, is Madeline, in Lassen County. Daily trains are run from Madeline to Reno, Nevada.

There are flouring mills located at Bidwell, Lake City, Cedarville, New Pine Creek, Alturas, and Adin. There are sawmills located at Bidwell, Cedarville, Eagleville, Willow Ranch, Davis Creek, Jess Valley, Alturas, Adin, and Willow Valley.

STATISTICS OF MODOC COUNTY, 1908-9.

General Statistics.

Number of farms	97
Expended on roads, last fiscal year	$21,819
Number of miles of public roads	700
Road levy per $100, 1909	30c

Fruits, Vegetables, Etc.

	Total Production.	
Green—	*Pounds.*	*Value.*
Apples	3,752,028	$49,398
Apricots	89,950	2,779
Asparagus	50	12
Blackberries	16,836	1,343
Beans	25,895	902
Beets	336,925	44,608
Cabbage	227,875	6,130
Cauliflower	1,000	30
Corn	15,860	1,450
Currants	10,900	810
Cherries	51,522	3,000
Gooseberries	18,456	593
Loganberries	2,531	175
Nectarines	1,225	57
Onions	18,770	553
Pears	137,600	2,230
Peaches	155,340	7,400
Peas	15,435	650
Plums	278,765	6,080
Irish potatoes	1,434,000	17,553
Prunes	54,570	1,705
Raspberries	27,830	2,095
Strawberries	20,106	1,545
Tomatoes	317,900	8,275
Totals	7,001,369	$159,373
Dried—	*Pounds.*	*Value.*
Apples	2,010	$161
Apricots	37	37
Beans	21,235	1,235
Onions	76,355	2,048
Pears	100	8
Peaches	300	24
Peas	3,310	185
Plums	180	53
Totals	103,527	$3,751
Canned—	*Cases.*	
Apples	11	
Apricots	45	
Blackberries	60	
Beans	14	
Corn	15	
Gooseberries	60	
Cherries	130	
Gooseberries	60	
Nectarines	5	
Pears	126	
Peaches	91	
Peas	10	
Plums	120	
Raspberries	96	
Strawberries	28	
Tomatoes	131	
Loganberries	7	
Currants	55	
Total	1,064	

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	1,756	$7,350
Ducks	16	88
Geese	30	133
Turkeys	165	2,460
Eggs	57,842	12,090
Total value		$22,121

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	7,523	13,506	$1,082,872
Barley	7,419	11,809	175,061
Oats	295	403	12,614
Rye	267	103	4,080
Corn	15	10	518
Total cereals..	15,519	25,831	$1,285,145
Alfalfa hay	6,779	17,012	$95,144
Grain hay	1,792	2,529	18,047
Grass hay	36,696	68,990	334,263
Total hay	45,367	88,531	$447,454

Wines, Brandies, Etc.

	Gallons.	*Value.*
Cider	2,905	$1,460
Vinegar	800	400

Number of breweries, 1.

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	2	.....	.....
Butter, pounds	.....	60,165	$13,405
Cheese, pounds	.....	1,200	264

Miscellaneous Products.

	Pounds.	*Value.*
Beeswax	750	.....
Flowers and plants, acres	4	.....
Honey	28,556	$7,190
Alfalfa seed	472,975	56,460
Grass seed	1,200	120
Sugar beets, tons	33,250	665
Dried beans	103,380	5,169
Squash	38,900	1,167
Dewberries	13,419	559
Dried onions	53,450	2,138
Cucumbers	10,920	328

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	12,818	$391,375
Stock	43,545	751,920
Dairy cows—Graded	1,194	38,000
Thoroughbred—		
Shorthorns	150	15,000
Calves	6,394	33,170
Swine	7,489	43,525
Horses—		
Thoroughbred	124	93,400
Standard-bred	220	38,800
Common	9,201	546,715
Colts	1,674	31,730
Jacks and jennies	122	19,190
Mules	1,367	43,550
Sheep	83,936	370,320
Lambs	33,664	98,025
Angora goats	314	5,665
Wool, pounds	749,045	149,710
Mohair, pounds	4,600	1,150
Full blooded Merinos	350	6,000

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	130,000	$3,500,000
Sawmills, number	7	.....
Fuel, wood, cords	2,000	.....
Lumber, feet	953,100	26,000
Shakes	50,000	250
Shingles	970,000	4,600

Power used for mills and manufactories in county—Steam, 9; water, 4; electrical, 2.

STATISTICS OF MODOC COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	29,273	7,540	36,813
Apricot	599	83	682
Cherry	1,161	330	1,491
Nectarine	30	13	43
Peach	2,089	.....	2,089
Pear	1,606	.....	1,606
Plum	2,733	.....	2,733
Prune	724	.....	724
Quince	17	.....	17
Total fruit trees.	38,232	7,966	46,198
Butternut	1	.....	1
Walnut	166	13	179
Total nut trees.	167	13	180
Grapevines	48	.....	48
Berries, acres	47	.....	47

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Brick	1	....	.....
Flouring mills	5	15	$75,000
Leather goods	1	2	1,500
Meat products—			
Lard		....	26,805
Meat packed		....	82,650

Manufactured Output.

	Quantity.
Brick, thousand	120
Flour, barrels	8,250
Lime, barrels	50
Lard, pounds	5,900
Tallow, barrels	46,212
Salt, tons	50

MONO COUNTY.

Mono is a long narrow county lying on the eastern slope of the Sierras, its greatest length bordering on the State of Nevada, which forms its northeastern boundary, its general direction being southeast and northwest.

The general contour is mountainous and very rough, all but 400 square miles, or less, being mountainous. The western portion lies among the Sierra Nevada Mountains, along their summit, the heights being clad in snow, and the slopes of the range being covered with forest trees.

Among the highest peaks are Mount Dana, 13,627 feet; Mount Lyell, 13,217 feet; and Castle Peak, 13,000 feet. The greater portion of the population is in the eastern part, in the valleys and the mining camps in the surrounding mountains. This portion, which has always been considered a strange, mysterious country, is of a desert-like, volcanic character, abounding in salt pools, alkali, and volcanic table-lands, its character being significantly indicated by some of the local names, such as Hot Springs, Geysers, Sulphur Springs, Black Lake, Soda Pond, Volcano, Obsidian Mountain, Deep Canyon, Volcanic Tableland, Red Crater, Adobe Meadows, and Oasis.

Mono Lake, the "Dead Sea of America," is one of the attractions, and situated in the center of the county; it is about 12 miles long and 8 miles wide; its waters are a somewhat unusual compound, various chemical substances being found in solution in them. Several attempts heve been made to utilize this water without success. This lake has all the appearances of having once been the scene of volcanic action. The country surrounding it, as Bodie, Aurora, Lundy, Tioga, and Benton, abounds in minerals. The lake has a number of small streams flowing into it, but is without a perceptible outlet.

Owens River in the south, which takes its rise in a high peak in the Sierras, and Kitten and Walker rivers in the north, are the principal streams. One passes through the southern part into Inyo County. The other, after rising in Mono County, continues its course into the State of Nevada. These two streams with their branches, together with the small streams that flow into Mono Lake, furnish the principal water supply for irrigation.

The retaining of the snow in the high mountains, at the sources of the streams used for irrigation, until later in the season, assures an abundance of pasturage on the mountain ranges, which are thronged with vast herds of cattle and bands of horses and sheep that are brought from the lower sections to graze during the summer.

That portion of the valley soil lying contiguous to the streams is very rich. A great deal of the sagebrush land, formerly considered barren, is found to be very productive when placed under cultivation. Thus the area of tillable land has been vastly increased within the last few years, and wherever water can be got on the land, even well up on the foothills, there are farms that are making comfortable homes for their owners.

The agricultural resources are chiefly confined to the raising of hay and the hardier cereals and vegetables for home consumption. The small surplus finds a ready market in the mining camps. Apples raised in the lower valleys are of superior quality and flavor and thrive well. Plums and peaches are grown on a limited scale. Berries also do well, considering the high altitude.

Grazing is the leading industry, and the pasturage is good and plentiful. Herds of dairy cattle are moved from the valleys during the summer, and an excellent product of butter is made. Large bands of sheep are also driven to its mountains for summer pasturage. Goats hogs, horses, poultry, and mules are raised in large numbers.

The timber belt is very large and the product of good marketable quality, but as there is no means of transportation to market, the development of the lumber interests is retarded, although considerable quantities are used for local mining purposes.

Bridgeport is the county seat, and is located in a prosperous farming section.

Considerable mining for precious metals is carried on, the leading camp being Bodie. This industry is prosperous. The introduction of the cyanide process, and the installing of electric power plants on the several streams of the county, thereby furnishing cheap power, make it possible to work at a profit large bodies of low-grade ore that heretofore were of no value, on account of cost of reduction.

STATISTICS OF MONO COUNTY, 1908-9.

General Statistics.

Area, 2,796 square miles, or 1,789,400 acres.	
Number of farms	170
Number of acres assessed	170,480
Value of country real estate	$567,405
Of improvements thereon	$132,420
Of city and town lots	$17,245
Of improvements thereon	$77,605
Of personal property	$459,010
Total value of all property	$1,253,685
Expended on roads, last fiscal year	$3,164
Expended for bridges, last fiscal year	$1,016
Number of miles of public roads	300
Road levy per $100, 1909	20c
Value of county buildings	$50,000
Irrigating ditches, cost	$88,000
Railroads, steam, miles	64
Electric power plant—1; assessed value	$6,000
Electric power lines—miles, 21; assessed value	$11,500
Number of acres irrigated	50,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	105	80	$2,800
Barley	25	15	480
Oats	5	4	140
Total cereals.	135	99	$3,420
Alfalfa hay	1,000	3,750	$22,500
Grass hay	3,300	3,500	21,000
Total hay	4,300	7,250	$43,500

Wines, Brandies, Etc.

Number of breweries, 1.

Number of Fruit Trees and Vines.

	Bearing.
Apple	500
Apricot	5
Cherry	25
Peach	25
Pear	10
Plum	25
Quince	5
Total fruit trees	595

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	261	$6,525
Stock	2,264	22,640
Dairy cows—Graded	263	6,575
Calves	572	2,860
Swine	153	945
Horses—		
Standard-bred	12	2,400
Common	1,268	48,855
Colts	421	11,105
Jacks and jennies	5	420
Mules	75	3,055
Sheep	7,213	19,035
Common goats	20	25
Total stock all kinds	12,527	$123,440
Wool, pounds	183,000	$32,200

Forest Products.

	Amount.	*Value.*
Sawmills, number	3	$3,500
Fuel, wood, cords	2,000	5,000
Lumber, feet	800,000	.....

Power used for mills and manufactories in county—Steam, 2; water, 1; electrical, 3.

MONTEREY COUNTY.

Monterey County is situated about 100 miles south of San Francisco, and 300 miles north of Los Angeles, on the Pacific coast. It is 124 miles long and 45 miles wide, its extreme length being from north to south.

Owing to the peculiar topography, with its rough mountains and broad plains, its great river running from south to north, with tributaries from either side, its rolling hills and rugged mountains, it is found to be a miniature of the State, with its entire diversity of climate and soil, enabling it to yield everything produced in the State, and rendering it one of the most desirable regions for settlement.

Its rivers furnish a never-failing supply of water for irrigation, and the mountains abound in minerals—gold, silver, copper, coal, bitumen, and oil.

The county is divided into three sections—the mountains and hills on the east, mountains and hills on the west, and the great Salinas Valley situated between these ranges of mountains.

The portion of Pajaro Valley lying south of the Pajaro River, and running to Monterey Bay on the southwest, is in Monterey County, and is about 15 miles long, and from 6 to 8 miles wide. The land is exceedingly fertile and under a thorough system of cultivation, producing immense crops of all kinds of vegetables, grain, fruit, and berries. Well tilled farms greet the eye, and villages, schoolhouses, churches, and picturesque residences dot the landscape in every direction. The foothills are covered with flocks and herds, and the lower ranges are timbered with live oak. The Pajaro River flows southwesterly and finds an outlet in Monterey Bay, near the mouth of the Salinas River.

The great Salinas Valley opens out on Monterey Bay and extends southward 100 miles, with an average width of 10 miles; therefore its area is about 1,000 square miles, or 640,000 acres. The Salinas River flows through its entire length. The land may be divided into three classes, viz.: First, the heavy, rich bottom lands, which produce almost everything, the soil being sediment and black adobe, which often contains just enough sand to make it work easily. Second, the mesa or table-lands, particularly adapted to growing wheat, barley, and other cereals. Third, the uplands and slightly rolling hills, some of which are the finest fruit lands in California, and will produce oranges, lemons, grapes, peaches, apricots, almonds, walnuts, figs, apples, plums, pears, berries and all other fruits common to the State.

Nearly all semi-tropical fruits do well in some part of this county, especially in the thermal belt along each side of Salinas Valley. A number of orange and lemon trees in yards of Salinas City hang full of fruit each year and are never injured by frost.

In barley, beets, and carrots, this valley can not be surpassed.

Going south, wheat excels; and grapes, peaches, prunes, apricots, cherries, and almonds grow to perfection in the foothills, canyons, and small valleys, and figs do well in sheltered places.

Olive trees flourish with all the vigor they possess in their native country. Currants, gooseberries, blackberries, loganberries, and raspberries grow luxuriantly. Strawberries are in the market all the year round, and are shipped from Pajaro by car loads. Grapes grow to perfection everywhere in the county, except in the heavy bottom lands of the lower Salinas Valley.

As to potato raising, the Salinas Valley has no equal; here is the home of the famous Salinas Burbanks that are in such great demand all through the Northwest and thousands of sacks are shipped to the Philippine Islands. As high as four hundred bushels to the acre have been raised near Salinas.

Dairying is a very prominent, if not a leading industry. Some of the finest dairies in the State are in Monterey County, and some of the best cheese and butter in the State is made here. They have the latest and best improved machinery, and have found their business very profitable.

Extensive work has been done in the last few years in bringing the valley under a thorough system of irrigation. Opposite Soledad, on the south side of Salinas River, considerable irrigation is done around Fort Romie on lands purchased by the Salvation Army, and sold on most favorable terms to worthy poor in need of homes. This is one of the most prosperous colonies in America. Around the Spreckels sugar factory, four miles from Salinas City, a great deal of land has been irrigated for raising beets. This is the largest beet-sugar factory in the world.

The main transcontinental line of the Southern Pacific Railroad enters this county through Pajaro Valley on the north, and runs southeast through its entire length, paralleling the Pajaro and Salinas rivers.

Pajaro is the great shipping points for apples, berries, all fruits, and dairy products of its section.

Hotel Del Monte, "the queen of American watering places," including the main structure and two annexes, together with the connecting wings, is simply immense, and everything connected with the establishment is on the same magnificent scale. The grandeur of the hotel is repeated in the grounds, which cover 140 acres, laid out in lawns, flower beds, parks, and groves, and the landscape gardening is a marvel of beauty.

A little farther on is Monterey, situated on the beach of Monterey Bay, lying back on her sloping hills and overlooking the placid waters of the bay—one of the grandest and most beautiful townsites nature ever formed.

Two miles farther on is Pacific Grove. Nestled among the pines is this little town, with beautiful streets, magnificent cottages, fine churches and schoolhouses, charming drives, and with never a saloon in its sacred limits.

The harbor of Monterey Bay is second in importance on the coast. The largest battleships of our navy find anchorage within 100 feet of the shore, and during heavy storms at sea it is not unusual to see many ships of different nations anchored in the calm waters of the bay. The fishing is incomparable for quantity and variety, and two canneries are located at Monterey. There is an abalone canning factory located at Point Lobos, and one at Point Sur. Monterey Bay contains about one hundred and fifty species of food fish, and many are annually taken for market.

Salinas City, the county seat, is in the heart of the best portion of Salinas Valley, the head of the first division of the railroad, near the Spreckels sugar factory, and contains extensive gas and water works, a large flouring mill, a large creamery, a planing mill, and shops, banks, churches, and schoolhouses. There are many magnificent residences and well-improved streets. Fraternal societies are well represented.

Soledad, named for Soledad Mission, is in another wheat belt, and is an important shipping point for grain and dairy products. It is the nearest point to Paraiso Springs, whose waters contain medicinal properties of a high order.

The narrow gauge railroad from Pajaro to Salinas parallels the main line on the west, taps Monterey Bay at Moss Landing—where there are extensive warehouses and lumber yards, and where the coast vessels stop regularly for grain and merchandise—then continues to Spreckels' sugar factory, and is used principally for hauling beets to the factory and lime rock from the quarries, though considerable grain is shipped by it from the region west of Salinas.

STATISTICS OF MONTEREY COUNTY, 1908-9.

General Statistics.

Area, 3,600 square miles, or 2,304,000 acres.	
Number of farms	5,200
Number of acres assessed	1,590,312
Value of country real estate	$11,500,725
Of improvements thereon	$1,541,000
Of city and town lots	$2,576,741
Of improvements thereon	$2,382,300
Of personal property	$2,871,909
Total value of all property	$20,872,675
Expended on roads, last fiscal year	$81,000
Expended for bridges, last fiscal year	$3,799
Number of miles of public roads	1,550
Road levy per $100, 1909	50c
Value of county buildings	$115,000
Irrigating ditches—miles, 241; cost	$215,000
Railroads, steam—miles, 171; assessed value	$2,938,155
Railroads, electric—miles, 6; assessed value	$10,000
Electric power plants—4; assessed value	$73,000
Electric power lines—miles, 35; assessed value	$5,000
Number of acres irrigated	22,050

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	9,400	$329,000
Stock	32,400	648,000
Dairy cows—Graded	10,000	315,000
Calves	12,000	96,000
Swine	14,000	98,000
Horses—		
Thoroughbred	200	60,000
Standard-bred	3,600	360,000
Common	11,200	560,000
Colts	3,500	105,000
Jacks and jennies	40	3,600
Mules	600	66,000
Sheep	30,000	90,000
Lambs	10,000	20,000
Angora goats	1,800	7,200
Common goats	650	1,625
Total stock all kinds	130,390	$2,759,425
Wool, pounds	132,000	19,800
Mohair, pounds	18,500	3,700

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	98,133,333	$1,226,666
Apricots	995,000	3,800
Blackberries	500,000	5,625
Beans	360,000	14,400
Beets	400,000,000	1,000,000
Cabbage	20,000	400
Celery	20,000	600
Cauliflower	10,000	300
Corn	500,000	5,000
Currants	1,000	30
Cherries	30,600	1,224
Loganberries	437,500	6,250
Onions	200,000	4,000
Olives	400,000	12,000
Pears	3,357,000	33,570
Peaches	1,400,000	28,000
Peas	200,000	4,000
Plums	3,600	36
Irish potatoes	16,000,000	1,440,000
Prunes	1,110,000	11,100
Quinces	25,000	500
Raspberries	218,750	3,125
Strawberries	4,462,500	137,500
Tomatoes	100,000	750
Totals	528,484,283	$3,938,876

Dried—	*Pounds.*	*Value.*
Almonds	20,000	$2,000
Apples	360,000	21,000
Apricots	240,000	20,000
Beans	480,000	13,200
Onions	200,000	4,000
Peaches	2,000	160
Plums	2,000	100
Prunes	4,000	200
Walnuts	2,000	220
Totals	1,310,000	$61,480

Canned—	*Cases.*	*Value.*
Apples	600	$1,400
Apricots	350	1,550
Pears	300	600
Peaches	800	1,600
Tomatoes	400	600
Totals	2,450	$5,750

STATISTICS OF MONTEREY COUNTY, 1908-9—Continued.

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds.	Value.
Wheat	16,250	6,500	$208,000
Barley	80,000	32,000	768,000
Oats	2,000	700	20,300
Total cereals	98,250	39,200	$996,300
Alfalfa hay	1,600	8,000	$80,000
Grain hay	45,000	60,000	600,000
Total hay	46,600	68,000	$680,000

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	333,037	125,622	458,659
Apricot	37,650	6,222	43,872
Cherry	2,690	400	3,090
Fig	350	150	500
Lemon	125	50	175
Nectarine	175	50	225
Olive	6,040	250	6,290
Orange	300	100	400
Peach	8,930	2,000	10,930
Pear	11,190	3,560	14,750
Plum	1,800	800	2,600
Prune	22,200	300	22,500
Quince	250	100	350
Other kinds	1,000	500	1,500
Total fruit trees	425,737	140,104	565,841
Almond	2,500	500	3,000
Chestnut	150	50	200
Walnut	1,500	300	1,800
Other nuts	50	20	70
Total nut trees	4,200	870	5,070
Grapevines	12,780	1,700	14,480
Berries, acres	950	20	970

Fish Industry.

	Pounds.	Value.
Salmon	1,520,000	$54,720
Other kinds	1,440,000	43,200
Sardines, cases	28,000	143,500
Total value		$241,420

Dairy Industry.

	No.	Production.	Value.
Creameries	45	.....	.....
Butter, pounds		758,000	$227,400
Cheese, pounds		3,000,000	465,000
Condensed milk, cases	1	54,000	162,800

Poultry and Eggs.

	Dozen.	Value.
Chickens	18,000	$72,000
Ducks	250	1,225
Geese	150	1,200
Turkeys	400	4,800
Eggs	720,000	144,000
Total value		$223,225

Wines, Brandies, Etc.

	Gallons.	Value.
Beer, barrels	8,000	$52,000

Number of breweries, 2.

Forest Products.

	Amount.	Value.
Sawmills	1	.....
Fuel, wood, cords	35,000	$192,500
Lumber, feet	800,000	8,000
Pickets, pieces	20,000	1,000
Posts, pieces	5,000	500
Shakes, thousand	50	250
Shingles, thousand	500	1,500
Total value		$203,750

Power used for mills and manufactories in county—Steam, 42; electrical, 12.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 7,810	.....	$27,335
Beeswax	5,857	1,640
Honey	705,850	48,400
Sugar beets, tons	200,000	1,000,000

Manufactories.

	No.	No. of Empl's.	Value of Product.
Brick	1	21	$11,250
Cigars	8	40	.....
Confectionery	10	40	.....
Flouring mill	1	20	483,000
Lime	1	60	81,000
Planing mills	8	64	.....
Artificial stone	3	10	.....
Sugar, beet	1	450	1,875,000
Sardine canneries	2	40	143,500

Manufactured Output.

	Quantity.
Brick, thousand	900
Cigars	1,980,000
Flour, barrels	47,463
Lime, barrels	64,800
Hides, pounds	369,000
Tallow, barrels	500

NAPA COUNTY.

Napa County has almost 800 square miles of territory, and its southern boundary reaches down to within 29 miles of San Francisco. The Napa River, a short tidal stream, which drains the great Napa Valley, is navigable to the heart of the city of Napa.

There are many large creeks, brooks, and many springs in the hills, both mineral and otherwise, all of which would furnish limitless water for irrigation, if Napa County needed it.

Two steamers ply between the city of Napa and San Francisco daily, and scores of scows, steamers, and other tramp craft make many trips yearly between the cities named.

In addition to the water facilities, two steam roads and one electric line enter the city of Napa, thus making it one of the most desirable manufacturing towns in the State of California.

Napa County's leading industry is the raising of grapes and the making of wine, these products bringing the growers of the county and the winery owners more than $600,000 annually.

Another great asset is the making of cement at Napa Junction, where the plant of the Standard Portland Cement Company turns out between $2,500,000 and $3,000,000 of its product every year.

The tanneries and the shirt, shoe and glove factories ship over $1,500,000 worth of their finished product yearly. A county of many valleys, that named after the county is the largest and most important, being 35 miles in length, and from 1 to 5 miles wide, and spreads out fan-like at its lower end.

STATISTICS OF NAPA COUNTY, 1908-9.

General Statistics.

Area, 800 square miles, or 512,000 acres.	
Number of farms	3,600
Number of acres assessed	407,589
Value of country real estate	$5,221,225
Of improvements thereon	$2,761,350
Of city and town lots	$1,649,055
Of improvements thereon	$2,595,930
Of personal property	$2,352,210
Total value of all property	$14,752,470
Expended on roads, last fiscal year	$41,700
Expended for bridges, last fiscal year	$15,000
Number of miles of public roads	475
Road levy per $100, 1909	36 2-5c
Value of county buildings	$130,000
Railroads, steam—miles, 56.07; assessed value	$1,292,919
Railroads, electric, assessed value	$136,554

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	2,500	$12,500
Ducks	50	300
Turkeys	200	4,800
Eggs	15,000	37,500
Total value		$55,100

Power used for mills and manufactories in county—Steam, 24; electrical, 18.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	1,900,000	$12,590
Apricots	1,400,000	9,800
Blackberries	20,000	750
Cherries	410,200	20,500
Grapes	42,500,000	255,600
Loganberries	10,000	500
Pears	2,475,000	20,700
Peaches	3,000,000	18,750
Plums	635,000	6,250
Irish potatoes	400,000	.....
Strawberries	30,000	2,250
Totals	52,780,200	$347,690

Dried—	*Pounds.*	*Value.*
Apples	20,000	$1,000
Apricots	150,000	7,500
Pears	340,000	17,500
Peaches	500,000	20,000
Prunes	3,500,000	95,000
Totals	4,510,000	$141,000

Canned—	*Cases.*
Pears	17,500
Peaches	12,500
Plums	15,000
Total	45,000

STATISTICS OF NAPA COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	46,000	9,450	55,450
Apricot	16,000	2,205	18,205
Cherry	34,000	2,000	36,000
Fig	1,700	510	2,210
Lemon	1,090	440	1,530
Nectarine	390	120	510
Olive	44,310	580	44,890
Orange	2,730	1,560	4,290
Peach	106,720	6,100	112,820
Pear	68,100	840	68,940
Plum	121,470	36,010	157,480
Prune	97,490	5,560	103,050
Quince	1,070	610	1,680
Total fruit trees.	541,070	65,985	607,055
Almond	44,720	3,270	47,990
Walnut	9,890	1,960	11,850
Total nut trees.	54,610	5,230	59,840
Grapevines, acres.	94,800	5,420	14,900
Hops, acres	95	.....	.....
Potatoes, acres	440	.....	.....

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	3,128,250	$375,000
Brandy	12,260	10,000

Number of wineries, 39; distilleries, 2; breweries, 3.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	3,400	2,600	$75,000
Barley	5,240	5,400	135,000
Oats	5,910	1,750	58,500
Corn	7,100	17,500	345,000
Total cereals.	21,650	27,250	$613,500
Alfalfa hay	343	1,700	$17,500
Grain hay	22,000	35,000	425,000
Grass hay	520	520	4,680
Total hay	22,863	37,220	$447,180

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	332	$8,300
Stock	4,440	70,000
Dairy cows—Graded	9,255	230,000
Thoroughbreds — Angus, Ayrshire, Brown Swiss, Devon, Dutch Belted, Guernsey, Herefords, Jersey, Polled Angus, Holsteins, Red Polled, Shorthorns	130	6,500
Calves	3,180	16,000
Swine	2,660	13,300
Horses—Thoroughbred	5	4,000
Standard-bred	165	41,375
Common	5,550	277,500
Colts	1,410	28,250
Jacks and jennies	15	1,000
Mules	372	18,600
Sheep	3,360	10,080
Lambs	1,200	1,750
Common goats	190	380
Total stock all kinds.	32,274	$727,035

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	7	.....	.....
Butter, pounds	200,000		$50,000

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Bookbinderies	1	5	.....
Paper boxes	1	10	$10,000
Cement	1	175	3,000,000
Cigars	2	5	.....
Cooper shops	2	10	25,000
Foundries and iron works	3	10	10,000
Leather goods	2	5	3,000
Olive oil	1	.....	.....
Planing mills	1	20	30,000
Granite and marble.	3	10	.....
Tanneries	2	150	500,000
Gloves	3	250	50,000
Shoes	1	75	25,000
Shirts	2	100	15,000

NEVADA COUNTY.

Nevada County is situated in that part of the State of California generally known as the northern portion, although its county seat, Nevada City, is but sixty miles from the city of Sacramento. It has an area of about one thousand square miles and is bounded on the north by Sierra County, on the east by the State line between California and Nevada, on the south by Placer County, and on the west by Yuba County. From the Yuba County line Nevada County is hemmed in by the Yuba and Bear rivers, until their sources are reached. The South Yuba River heads in the high Sierras and runs across the county almost its entire length from east to west.

The climate is more varied than any other part of the State. On the rolling foothills of the western portion, where snow and frost are seldom seen, the elevation is slightly above the sea level, while on the eastern boundaries are the snow-capped peaks of the Sierra Nevadas, with an elevation of nearly 8,000 feet.

The mean temperature, using Nevada City as the center, is about 68 degrees Fahrenheit.

The principal towns in the county are Nevada City, with a population of 3,500; Grass Valley, 7,000, and Truckee, 2,000.

The Southern Pacific Railroad skirts the southern boundary line of the county for over thirty miles from west to east. From Colfax, on the line of the Southern Pacific Railroad, a narrow gauge railroad leads through Grass Valley, the metropolis of the county, to Nevada City, the county seat, a distance of 22 miles. Grass Valley and Nevada City, being only four miles apart, are also connected by an electric railroad. There is at present under course of construction what is known as the California Midland Railroad, which will connect Nevada City, Grass Valley, Auburn of Placer County, and Marysville of Yuba County.

Nevada County's splendid water system is also one of its many advantages so essential to the mine operator, farmer and fruit grower. At the present time there is a network of ditches, canals, and waterways aggregating 1,000 miles in length, giving the finest water power system and supply in the State. In this county are also situated three of the largest electrical power and lighting plants in California, by means of which both electric and water power is unexcelled.

The principal industries are farming, stock raising, dairying, fruit growing, and mining.

In the Chicago Park section, which is on the line of the narrow gauge railroad between Colfax and Grass Valley, the soil is particularly adapted to the culture of Bartlett pears, Hungarian prunes, and grapes, all of which are grown without irrigation and large shipments are made each year.

In the southwestern portion of the county where there is an abundance of water, the farmers are turning their attention quite extensively to dairying and are finding the same a profitable business. The Penn

Valley Creamery, being centrally located in that section of the county, buys all the cream from the farmers and is on a dividend paying basis.

In the production of gold, Nevada County has for the past forty years been unsurpassed. It has been a continual producer since the year of 1849, during which period of time it has added to the circulating medium of the world the gross amount of $270,000,000, yielding for a number of years past an annual average of about $2,250,000.

For the year 1908, the output was for gold $2,297,963 and for silver $21,914. Some of the mines of the county are working at a depth of 4,000 feet and have proven conclusively that in every instance where depth has been attained, the ore bodies and the values are equally distributed.

Copper deposits are also found within the county, and which are being opened at present, and undoubtedly in course of time this county will be classed among the large copper producing counties of the State.

STATISTICS OF NEVADA COUNTY, 1908-9.

General Statistics.

Area, 1,016 square miles, or 650,240 acres.	
Number of farms	420
Number of acres assessed	490,454
Value of country real estate	$2,551,715
Of improvements thereon	$1,582,020
Of city and town lots	$416,465
Of improvements thereon	$1,294,405
Of personal property	$1,060,285
Total value of all property	$6,904,890
Expended on roads, last fiscal year	$28,584
Expended for bridges, last fiscal year	$7,497
Number of miles of public roads	650
Road levy per $100, 1909	50c
Value of county buildings	$100,000
Mining and irrigating ditches—miles, 1,000; cost	$4,223,760
Railroads, steam—miles, 55.17; assessed value	$1,202,649
Railroads, electric—miles, 5.7; assessed value	$47,200
Electric power plants—4; assessed value	$194,810
Electric power lines—miles, 76; assessed value	$37,550
Number of acres irrigated	560

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	12,485	1,160	13,645
Apricot	165	25	190
Cherry	290	90	380
Fig	325	40	365
Lemon	15	.....	15
Nectarine	30	5	35
Olive	50	50	100
Orange	180	20	200
Peach	12,975	1,260	14,235
Pear	34,280	9,600	43,880
Plum	1,500	2,000	3,500
Prune	5,700	600	6,300
Quince	150	.....	150
Total fruit trees.	68,145	14,850	82,995
Almond	150	250	400
Chestnut	21	40	61
Pecan	5	.....	5
Walnut	300	1,000	1,300
Total nut trees.	476	1,290	1,766
Grapevines	700	150	850
Berries, acres	40	.....	40

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	175,000	$4,375
Apricots	6,000	300
Blackberries	37,500	1,850
Beans	16,000	800
Beets	17,000	340
Cabbage	150,000	2,250
Celery	7,000	350
Corn	20,000	300
Currants	700	56
Cherries	30,000	1,800
Figs	1,750	350
Grapes	150,000	3,000
Loganberries	1,400	100
Oranges, in 25-pound boxes	85	170
Olives	500	25
Pears	750,000	30,000
Peaches	150,000	3,750
Peas	10,000	400
Plums	50,000	1,000
Irish potatoes	400,000	5,000
Prunes	150,000	3,000
Raspberries	6,000	480
Strawberries	5,000	400
Tomatoes	40,000	500
Total value		$60,000
Dried—	*Pounds.*	*Value.*
Prunes	15,000	$750
Walnuts	5,000	750
Total value		$1,500

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	19,000	.....
Cedar, pine, fir, acres	19,000	$190,000
Sawmills, number	5	.....
Fuel, wood, cords	28,500	114,000
Laths, thousand	725	2,528
Lumber, feet	23,434,707	353,512
Paper pulp, tons	8,750	240,625
Pickets, pieces	47,905	1,005
Posts, pieces	5,000	1,250
Shakes, thousand	700	7,000
Total value		$909,920

Power used for mills and manufactories in county—steam, 20; water, 40.

STATISTICS OF NEVADA COUNTY, 1908-9—Continued.

Wines, Brandies, Etc.

	Gallons.	*Value.*
Sweet wines	6,500	$6,000
Beer, barrels	4,000	39,000
Vinegar	3,000	750

Number of wineries, small, 1; breweries, small, 5.

Dairy Industry.

	Production.	*Value.*
Creameries	.....	$5,000
Butter, pounds	84,000	27,552

Average price for butter per pound, 32.8 cents.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	800	$4,000
Turkeys	50	1,500
Eggs	48,000	12,000
Total value		$17,500

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Alfalfa hay	230	920	$13,800
Grain hay	5,835	5,835	116,700
Grass hay	175	175	1,750
Total hay	6,240	6,930	$132,250

Miscellaneous Products.

	Amount.	*Value.*
Natural ice, tons	129,500	$223,750
Gold, 1908	.....	2,297,963
Silver	.....	21,914
Copper, pounds	30,166	4,104
Lead, pounds	663	25
Granite, tons	700	2,100
Macadam, tons	3,623	1,387

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	650	$19,500
Stock	3,060	61,200
Dairy cows—Graded	700	28,000
Thoroughbreds—		
Jersey	100	6,000
Calves	1,416	14,160
Swine	500	3,500
Horses—		
Standard-bred	210	31,500
Common	1,475	147,500
Colts	125	6,250
Mules	40	4,000
Sheep	5,700	17,100
Lambs	2,000	5,000
Angora goats	350	875
Common goats	150	300
Total stock all kinds.	16,476	$344,885
Wool, pounds	33,500	$5,025

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Wood boxes	2	130	$354,429
Cigars	6	14	47,500
Confectionery	4	4	6,000
Foundries and iron works	3	30	100,000
Meat products—			
Hides		.....	11,500
Lard		.....	1,500
Pickles	1	170	485,000
Granite		.....	2,100

Manufactured Output.

	Quantity.
Cigars, thousand	1,000
Hides, pounds	109,500
Lard, pounds	53,500
Paper, pounds	15,850,000

ORANGE COUNTY.

Orange County is bounded on the north by Los Angeles County, on the east by San Bernardino and Riverside counties, on the south by San Diego County and on the west by the Pacific Ocean.

The Santa Ana River enters the county on the northeast boundary and empties into Newport Bay, furnishing water for the Anaheim Union and Santa Ana Valley irrigation companies. The Santiago Creek rises in the hills east of El Modena and furnishes water to the Serrano and J. T. Carpenter water companies.

The Santa Fe, Southern Pacific and Pacific Electric enter the county at the northwest boundary, running nearly parallel, meeting at Santa Ana, the Santa Fe continuing to San Diego, the Southern Pacific terminating at Newport Beach, the Pacific Electric running to Huntington Beach. The Santa Fe also enters the county on the northeast boundary, meeting the other Santa Fe line at Orange; the Pacific Electric also enters the county on the shore line at Bay City and extends along the coast to Balboa.

San Juan by the Sea, Arch Beach and Laguna Beach are open coast resorts. Corona del Mar, East Newport, Balboa, Newport Beach, and Port Orange are situated on Newport Bay, which is the best shipping place of the county. Huntington Beach, Sunset Beach, and Bay City, are situated on the northwest of and are connected with Newport Beach by the Pacific Electric Railway.

The Southern Pacific loads about 725 cars of gravel at McPherson on its Tustin Branch, the Santa Fe loads 365 cars of engine sand at San Juan by the Sea, and the Southern Pacific also loads about 300 cars of engine sand near Huntington Beach.

STATISTICS OF ORANGE COUNTY, 1908-9.

General Statistics.

Area, 780 square miles, or 439,261 acres.	
Number of farms	4,783
Number of acres assessed	426,063
Value of country real estate	$8,691,365
Of improvements thereon	$2,360,175
Of city and town lots	$3,032,025
Of improvements thereon	$2,324,930
Of personal property	$3,100,080
Total value of all property	$19,508,575
Expended on roads and bridges, last fiscal year	$73,824
Road levy per $100, 1909	30c
Value of county buildings	$121,790
Irrigating ditches—miles, 258; cost	$903,320
Railroads (3), steam—miles, 125.08; assessed value	$2,611,844
Railroads, electric — miles, 34.41; assessed value	$450,760
Electric power plants—2; assessed value	$47,040
Electric power lines, miles	68
Number of acres irrigated	20,838
Pumping plants, etc	$57,102

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	13,840	1,050	14,890
Apricot	169,315	26,540	195,855
Fig	2,500	.....	2,500
Lemon	80,900	31,540	112,440
Olive	23,000	.....	23,000
Orange	728,800	217,300	946,100
Peach	37,000	12,550	49,550
Pear	5,250	500	5,750
Plum and prune	20,000	.....	20,000
Total fruit.	180,605	289,480	1,370,085
Walnut	147,380	98,320	255,900
Grapevines	600	.....	600
Berries, acres	305	.....	305

Forest Products.

Eucalyptus trees (young), acres, 1,875.

Power used for mills and manufactories in county—Steam, 2; electrical, 1; water, 1.

STATISTICS OF ORANGE COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	5,100	2,050	$71,750
Barley	35,025	21,015	546,390
Oats	4,275	1,710	49,590
Corn	2,540	1,270	3,100
Total cereals..	46,940	26,045	$670,830
Alfalfa hay	3,620	19,720	$197,200
Grain hay	28,200	35,250	387,750
Total hay	31,820	54,970	$584,950

Dairy Industry.

	No.	Production.	Value.
Creameries	1	.....	.....
Skimming stations	5	55,480	$63,220
Butter, pounds		130,000	39,000

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	50,000	$750
Apricots	312,000	3,120
Blackberries, crates	5,266	5,266
Beans	295,000	11,600
Cabbage	15,930,000	119,471
Celery, cars	2,011½	535,059
Cauliflower, crates	14,100	70,500
Corn, sweet	15,000	150
Grapes	60,000	30,000
Grape fruit, boxes	3,840	3,840
Lemons, boxes	68,264	75,064
Onions	886,500	8,865
Oranges, boxes	1,215,420	1,276,191
Olives	47,000	24,250
Pears	129,370	1,293
Peaches	418,000	62,760
Peas	172,000	6,880
Persimmons	100,000	1,000
Plums	240,000	4,800
Irish potatoes	45,992,000	459,920
Sweet potatoes	6,087,000	76,085
Prunes	48,000	960
Strawberries, crates	20,000	22,000
Tomatoes	10,880,000	108,800
Total value		$2,908,628

Dried—	Pounds.	Value.
Apricots	2,820,000	$225,600
Beans, sacks	285,000	800,000
Peanuts	60,000	2,400
Walnuts	8,724,000	872,400
Total value		$1,900,400

Canned—	Cases.	Value.
Peaches	6,666	$6,666
Tomatoes	33,333	33,333
Cannery assorted	11,542	80,000
Total value		$119,999

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	24,700	$6,175
Sweet wines	13,000	3,900
Beer, barrels	9,000	72,000
Brandy	1,500	750

Number of wineries, 6; distilleries, 4; breweries, 1.

Fish Industry.

	Pounds.	Value.
Salmon	589,510	$17,885

Live Stock Industry.

	Number.	Value.
Cattle—Beef	294	$11,760
Stock	9,520	190,400
Dairy cows—Graded	100	3,000
Thoroughbred, all kinds.	5,405	438,225
Heifers	464	6,960
Calves	2,200	11,000
Swine	2,200	22,000
Horses—		
Thoroughbred	38	5,700
Standard-bred	90	20,250
Common	4,525	678,700
Colts	1,520	93,200
Jacks and jennies	3	1,500
Mules	1,420	284,000
Sheep	21,900	65,700
Lambs	6,100	6,100
Total stock all kinds..	35,779	$838,495
Wool, pounds	490,500	$73,565

Poultry and Eggs.

	Dozen.	Value.
Chickens	17,285	$87,425
Ducks	150	900
Geese	160	3,200
Turkeys	240	4,800
Eggs	241,996	72,597
Total value		$168,922

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 9,000	.....	$27,000
Beeswax	10,000	3,000
Honey	600,000	36,000
Sugar beets, tons	135,923	679,615
Chili peppers, green	600,000	7,500
Chili peppers, dry	150,000	15,000
Okra	5,000	150
Rhubarb	5,000	125
Dill pickles	10,000	200
Apricot pits	1,000,000	12,500
Apricot kernels	200,000	14,000
Bean straw, baled, tons.	500	4,000

Manufactories.

	No.	No. of Empl's.	Value of Product.
Folding crates	1	.....	.....
Paper boxes	1	9	$50,000
Wood boxes	1	4	25,000
Brick	1	18	12,000
Cigars	3	17	37,000
Confectionery	3	6	16,000
Flouring mill	1	20	392,000
Ice plant	1	15	12,184
Machinery	1	10	125,000
Nurseries	21	85	392,100
Planing mills	5	78	158,000
Artificial stone	1	3	7,000
Sugar, beet	2	336	1,000,000
Tiling	2	11	77,361
Eucalyptus oil	..	....	1,800
Crude oil	..	..	13,000
Olive oil	..	..	1,500
Pickled olives	..	..	200

Manufactured Output.

	Quantity.
Brick, common	1,500,000
Cigars	7,400,000
Flour, barrels	16,000
Olive oil, gallons	500
Pickles, gallons	200

PLACER COUNTY.

Placer County lies between latitude 38° 70′ and 39° 30′. Its direction is northeast and southwest. It is about 100 miles long and of varying widths, from 10 to 30 miles, the course and distance being defined by the course of the rivers which mark its boundaries. It extends from about 8 miles from the Sacramento River to the summit of the Sierra Nevada Mountains. Just above Auburn, between the Bear and American rivers, the county is very narrow, being but about 8 miles across. Above Auburn it widens out into the two divides lying between the Bear River and the Middle Fork of the American River. These are known as the Dutch Flat or Railroad Divide, and the Forest Hill Divide. The southwestern portion is more regular in shape than the part just described. This section contains the foothill and level agricultural lands. Its shape is nearly a parallelogram, the southwest two thirds being on the plains proper, and the southeast one third being the foothill and fruit district.

Of the area, 810 square miles are mountainous, 450 foothills, and the remainder valleys. The entire extent faces toward the west, extending from an altitude of some 40 feet on the plains in the western portion to over 7,000 feet at its eastern boundary line, embracing nearly every variety of climate known in the State. At the eastern boundary, separating it from the State of Nevada, is Lake Tahoe, one of the most picturesque lakes in America. The topography of Placer County is as irregular as is its shape. Imagine the whole Atlantic coast from Labrador to Tallahassee incorporated into one county, and one will have a fair idea of what may be found in Placer, exaggerated as to size, but not as to the great variety of climate, elevation, soils, and resources. As to the latter, the whole Atlantic seaboard can hardly equal the endless variety to be found within the borders of this county, which rivals Florida in the quality of its oranges, excels New Jersey in peaches, equals the New England States in its granite quarries, and compares favorably with Maine in the quality of its lumber.

From an elevation of about 2,500 feet up to the summit of the mountains snow falls in the winter, light at the lower edge of the line, and increasing in depth as it ascends the Sierras. Here is a strip of territory from the snow line up to an elevation of 3,000 feet, particularly well adapted to the apple, the pear, and a great variety of vegetables.

The soil of the western or valley portion is of the same general alluvial composition as all the soil in the Sacramento Valley, and is well adapted to the growth of grain. Over 30,000 acres are annually devoted to wheat, barley, oats, and hay. The low foothills back of Lincoln are excellent for the grape.

The soil of the valley lands is mostly a red loam, mixed with considerable clay in spots; that of the foothills is a gravelly red loam, in places light and sandy, and is excellent for the production of fruits. Further up the soil changes to a red character, with a slate bedrock.

This, too, is very fertile. The agricultural region includes the valley and foothill lands all the way from the western boundary to an elevation above Colfax. The foothills everywhere possess a soil which only needs cultivation. The granite soils around Newcastle are composed largely of clay, sand, soda, potash, lime, phosphorus, iron, and manganese. The constant decomposition that is going on appears to be of nearly endless duration, and of such a nature as to render the soil almost inexhaustible. Artificial fertilization has not yet been found necessary.

For an irrigation water supply, Placer has three sources—the Yuba, Bear, and American rivers. Including its branches, the Bear River irrigation ditch is 200 miles in length. This system has been increased in its capacity, and brings water from the Yuba River, so that an abundance is assured. There are several other canals, originally built for mining, but now used for irrigation.

Placer County holds a foremost position among the fruit producers, and it is the most easterly of the counties in California. With the Central Pacific Railroad running the entire length of her territory, she is one day nearer the Eastern market than any other part of the State, a very large item in the shipping of green fruit. In her thermal belt fruit ripens earlier than in most other places in the State, another large advantage. Pears, plums, prunes, apples, apricots, cherries, persimmons, pomegranates, quinces, and figs all do well. Peaches have been grown for the past twenty-five years, and failure of a crop is unknown. Fine oranges are produced, and Placer holds a position beside Butte in the northern citrus belt. In the production of small fruits, berries, and table grapes, Placer holds a foremost place.

The largest cherry trees in the world are at the ranch of Robert Hector, from one of which has been picked as high as 3,000 pounds in one season. At the Pan-American Exposition Placer won gold medals for peaches, oranges, and grapes. An exhibit of fifty oranges averaged twenty-four ounces in weight.

A lemon that was on exhibition at the Sacramento Chamber of Commerce measured 22 inches in circumference the small way, and weighed three and a half pounds.

Olive growing is a profitable industry. The principal orchards are provided with manufacturing plants and are producing a very fine quality of oil.

Dairying and stock and poultry raising are extensive industries. Butter making is carried on in the summer, the mountain ranges providing plenty of natural feed; the butter is of a very fine quality.

Considerable quantities of vegetables are raised, not only for local consumption, but also for shipment abroad.

Much sugar and yellow pine, fir, spruce, and cedar are found in the mountains, and the lumber output from that section has been very large for many years. Oak and scrub pine abound all over the foothills, and fuel is plentiful.

Placer County ranks well up among the mining counties. Her average yearly contribution to the world's wealth is something above the million mark. The total production since the discovery of gold at Auburn, May 16, 1848, is estimated at much over $75,000,000. The mining methods include drift, river, placer, and quartz. Placer's drift mines are among the largest in the world.

The granite quarries rank with the best in the United States. Nearly all the street curbing in San Francisco is from the Placer quarries, while the State Capitol is an example of the value and beauty of foothill granite.

Potter's clay is found in abundance at Lincoln, from which is manufactured sewer pipe, tiling, pressed brick, architectural terra cotta, and glazed brick for interior decoration.

Placer County is a natural sanatorium. As a resort for patients suffering from pulmonary diseases, leading physicians say it has no equal on the Pacific coast. It is here patients find relief, and some of them are cured. The altitude is just right for people suffering from asthma or bronchial diseases.

STATISTICS OF PLACER COUNTY, 1908-9.

General Statistics.

Area, 1,390 square miles, or 879,600 acres.	
Number of farms	994
Number of acres assessed	657,200
Value of country real estate	$4,102,295
Of improvements thereon	$1,091,810
Of city and town lots	$901,765
Of improvements thereon	$1,193,375
Of personal property	$1,543,615
Total value of all property	$8,833,160
Expended on roads, last fiscal year	$45,342
Expended for bridges, last fiscal year	$9,740
Number of miles of public roads	890
Road levy per $100, 1909	40c
Value of county buildings	$260,000
Irrigating ditches—miles, 154; cost	$182,300
Railroads, steam—miles, 140.47; assessed value	$3,933,424
Electric power plants—3; assessed value	$39,400
Electric power lines—miles, 90; assessed value	$45,000
Number of acres irrigated	14,150

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	137,400	$39,400
Sweet wines	119,700	28,300
Brandy	8,450	7,670
Vinegar	11,450	960

Number of wineries, 2.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	2,090	$42,300
Stock	1,820	23,980
Dairy cows—Graded	2,710	70,300
Thoroughbred—Jersey	100	4,000
Calves	719	4,290
Swine	845	2,490
Horses—Thoroughbred	7	3,440
Standard-bred	8	2,120
Common	1,630	52,840
Colts	320	6,370
Jacks and jennies	38	760
Mules	310	12,400
Sheep	25,100	50,200
Lambs	1,800	1,800
Angora goats	800	1,600
Common goats	2,500	2,500
Total stock all kinds	40,797	$281,390
Wool, pounds	137,000	$15,970

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	276,200	$3,970
Apricots	293,300	12,600
Blackberries	101,200	3,150
Currants	3,740	390
Cherries	461,700	40,100
Figs	10,400	375
Grapes	1,947,200	57,900
Lemons, boxes	675	675
Loganberries	73,100	3,250
Nectarines	12,650	450
Oranges, boxes	54,160	54,100
Pears	3,971,450	63,940
Peaches	13,709,600	264,290
Persimmons	15,000	560
Plums	9,423,190	235,575
Quinces	19,260	224
Raspberries	40,150	1,645
Strawberries	138,350	6,974
Tomatoes	153,740	2,960
Total value		$753,128
Dried—	*Pounds.*	*Value.*
Figs	9,780	$560
Pears	37,900	1,495
Prunes	40,450	1,670
Totals	164,970	$6,415
Canned—	*Cases.*	*Value.*
Apples	493	$987
Apricots	75	150
Blackberries	640	1,280
Pears	1,150	2,300
Peaches	4,125	8,250
Tomatoes	3,800	5,600
Totals	10,283	$18,566

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	14,770	3,960	$137,200
Barley	9,875	1,960	69,700
Oats	6,940	1,690	61,300
Total cereals	31,585	7,610	$268,200
Grain hay	29,300	36,420	$364,200

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	4	83,200	$19,790
Butter, pounds		6,740	1,685

STATISTICS OF PLACER COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	18,400	4,375	22,775
Apricot	10,150	6,100	16,250
Cherry	21,040	4,875	25,915
Fig	6,375	900	7,275
Lemon	970	.....	970
Nectarine	7,215	1,460	8,675
Olive	34,305	840	35,145
Orange	39,370	9,760	49,130
Peach	979,040	278,300	1,257,340
Pear	107,600	26,400	134,000
Plum	222,470	42,440	264,910
Prune	23,905	3,360	27,265
Quince	2,340	.....	2,340
Total fruit.	1,473,180	378,810	1,851,990
Almond	6,400	1,340	7,740
Walnut	500	200	700
Total nut	6,900	1,540	8,440
Grapevines	3,608,750	982,500	4,591,250

Manufactories.

	Quantity.
Brick, thousand	2,000
Olive oil, gallons	3,000

Forest Products.

	Amount.	Value.
Area of timber lands, acres	100,000	.....
Sawmills, number	3	$38,000
Lumber, feet	11,200,000	130,600
Posts, pieces	750,000	7,500
Shakes	378,000	1,890
Total value		$177,990

Power used for mills and manufactories in county—Steam, 5; water, 3; electrical, 4.

Miscellaneous Products.

	Value.
Flowers and plants, acres, 30	$30,000

Manufactured Output.

	No.	No. of Empl's.	Value of Product.
Cigars	2	10	$19,700
Confectionery	2	6	3,800
Olive oil	2	10	12,700
Pickled olives	.....	.....	1,000
Sewer pipe	.....	.....	379,000
Planing mills	2	10	27,000
Potteries	1	400	394,500
Granite, cars, 840	..	200	.....

RIVERSIDE COUNTY.

Riverside County was formed in 1893 from the southwestern part of San Bernardino and the northern part of San Diego counties. It is about 200 miles long by 40 miles wide, and embraces most varied geographical and topographical features, climate, scenery, soil, agricultural, horticultural, and mineral resources. It contains within its borders one of the highest mountains of southern California and the greatest depression below sea level.

The principal rivers of the county are the Colorado, which forms its eastern boundary; the Santa Ana, having its head in the San Bernardino range of mountains, flowing through the northwestern part of the county furnishing irrigation for a large area of land; the San Jacinto, having its source in the San Jacinto range, flowing through the San Jacinto, Hemet, and Perris valleys and forming Lake Elsinore.

While the progress of the county has been practically confined to its northwest corner, which embraces the largest orange growing district in the world, and is supplied by one of the best and most complete irrigating systems in the State, the entire western portion is being brought under cultivation from the rapid development of artesian wells.

Beaumont and Banning, two growing towns and prosperous communities of the "Pass country," are well known for their deciduous fruits, hay and grain crops, and stock interests. Further east the Coachella Valley is producing vegetables, melons and cantaloupes extensively, which, on account of early maturity, reach the markets in advance of other localities. The valley has four trading points, Indio, Coachella, Thermal, and Mecca, all growing communities. The Government has two experimental stations in this valley for the propagation of the date palm and already has several trees in bearing. The excellency of the fruit proves this locality to be well adapted to this industry. Quite an acreage of eucalyptus is being planted and spineless cactus is receiving some attention.

The Palo Verde country, in the extreme eastern portion and bounded by the Colorado River, is receiving a great deal of attention and promises to develop into a very prosperous agricultural community.

The central and greater part of the eastern portion of the county is desert, but known to be heavily mineralized with almost every known mineral, gold, silver, copper, iron, lead, tin, borax, soda, and nitrates. The high cost of freight, fuel and scarcity of water, making prospecting dangerous, all combine to retard mining developments, but as transportation facilities increase mining will be one of the leading features of the county.

The San Jacinto and Hemet valleys, situated about 45 miles southeast of Riverside City, at the base of the San Jacinto Mountains, are excellently adapted to diversified farming and the foothills to stock grazing The San Jacinto Valley is watered by numerous flowing wells and the

Hemet Valley by the great Hemet dam, the largest piece of solid masonry in the West, forming a reservoir filled with pure mountain water from the snows of the San Jacinto Mountains, the supply of which is more than sufficient for all purposes and irrigation. The town of Hemet is one of the most prosperous of the county. Three miles distant is San Jacinto, one of the oldest towns in southern California, and has maintained a steady growth from its farming, dairying, and lumber interests, the mountains adjacent being heavily timbered. A branch of the great Cawston Ostrich Farm is located here, and the town has the reputation as a health resort on account of its lithia and hot sulphur springs. The potato is one of the staples for which Hemet is famous. Alfalfa and broomcorn are grown extensively. All kinds of deciduous fruits do well and quite an acreage of citrus fruit is in bearing.

The town of Elsinore, situated about 20 miles southwest on the shore of Lake Elsinore, is made prosperous from its varied products. Dressed stone, clay and clay products, honey, dried fruits, olives, olive oil and all kinds of farm products. It is famed as a health resort, the hot sulphur springs located on the north side of the lake being remarkable for healing qualities in some forms of disease.

Perris is a thriving village situated about halfway between the city of Riverside and Hemet. The Perris Valley, including Alessandro and Moreno, is making wonderful progress. The soil is very fertile and the discovery and development of an underground lake with practically unlimited water supply has opened up new industries and hundreds of acres of alfalfa are being sown. The eucalyptus industry is receiving its share of attention and quite an extensive acreage is being planted in these sections. Transportation is furnished by the Santa Fe Railway.

Corona, the second city in size in the county, is known for its lemon groves, which are among the best in the world, as well as its fine orange groves and its many manufacturing enterprises. Clay products comprise the manufacture fourth in importance in the United States and of importance in the county the clay industry is first, the deposits being marvelous and of almost inexhaustible supply.

Riverside, the metropolis and county seat, is noted as being one of the most beautiful cities in California; has more miles of oiled macadam streets than any community of like size, and takes great pride in keeping them clean. It claims to be the greatest orange growing center in the world, the annual production being over six thousand car loads. It is a city of churches, all denominations being represented, together with its magnificent county buildings, public library, commodious public school buildings of architectural beauty, new Y. M. C. A. building just completed costing $80,000, appropriation of $100,000 for Government building, $125,000 bonds voted for new city hall, good theater buildings, ample hotel accommodations, including the Glenwood Mission Inn, one of its most valued assets, public parks, fine drives, perfect sanitation, a bountiful water supply, electric railway system, electric and gas plants, cement works employing upward of three hundred men, station for three continental railway systems, and no saloons, are features which go to make up a happy and contented citizenship.

Arlington, a suburb of Riverside and contained in its municipality, is a progressive village and the seat of Sherman Institute, a Government school for Indians.

The public school system of the county is very efficient and ample, there being sixty-five school districts, eight of which are high schools. The total expenditure for school purposes during the past fiscal year was $294,312.20.

STATISTICS OF RIVERSIDE COUNTY, 1908-9.

General Statistics.

Area, 7,000 square miles, or 4,480,000 acres.	
Number of acres assessed	1,669,663
Value of country real estate	$26,108,500
Of improvements thereon	$13,633,330
Of city and town lots	$7,881,605
Of improvements thereon	$10,638,400
Of personal property	$5,020,500
Total value of all property	$63,882,395
Expended on roads, last fiscal year	$113,040
Expended for bridges, last fiscal year	$350
Road levy per $100, 1909	60c
Value of county buildings	$373,463
Irrigating ditches—miles, 130; cost	$4,050,232
Railroads, steam — miles, 210.368; assessed value	$4,509,791
Railroads, electric — miles, 10.15; assessed value	$21,050
Electric power plants—3; assessed value	$22,500
Electric power lines, assessed value	$41,555
Number of acres irrigated	50,000
Gas companies, 3	$62,700

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	7,200	4,435	$90,200
Barley	37,857	16,746	418,500
Oats	6,375	2,272	94,264
Corn	27	234	6,632
Total cereals	51,703	23,687	$609,596
Alfalfa hay	10,710	65,545	$808,620
Grain hay	83,933	55,880	663,657
Total hay	94,643	121,425	$1,472,277

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	2,987	3,920	6,907
Apricot	48,854	26,494	75,348
Cherry	1,600	1,050	2,650
Fig	1,503	1,473	2,976
Lemon	262,014	74,707	336,721
Nectarine	50	10	60
Olive	40,268	52,052	92,320
Orange	1,513,524	156,394	1,669,918
Peach	41,665	55,265	96,930
Pear	10,975	3,277	14,252
Plum	608	397	1,005
Prune	29,956	1,341	31,297
Quince	123	79	202
Other kinds	317	246	563
Total fruit	1,954,444	376,705	2,331,149
Almond	16,578	18,292	34,870
Walnut	2,152	5,266	7,418
Total nut	18,730	23,558	42,288
Grapevines	3,150,000	.....	3,150,000
Berries, acres	94	.....	94

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	1,430,200	$16,077
Apricots	2,051,238	21,434
Asparagus	3,750	225
Blackberries	15,000	840
Beans	30,000	900
Cabbage	360,000	5,280
Corn	10,000	350
Cherries	60,000	3,600
Figs	12,500	370
Grapes	1,957,000	30,295
Grape fruit	63,688	7,875
Lemons, boxes	516,160	878,229
Loganberries	8,000	680
Nectarines	4,000	55
Onions	20,000	600
Oranges, boxes	2,520,336	3,644,635
Olives	549,500	8,662
Pears	378,547	7,593
Peaches	1,087,769	18,207
Peas	11,250	675
Plums	275,525	2,755
Irish potatoes	3,589,000	18,207
Sweet potatoes	34,000	5,100
Chili peppers	20,000	600
Quinces	2,100	210
Raspberries	7,500	500
Strawberries	13,000	530
Tomatoes	244,880	4,650
Cantaloupes	340,000	10,200
Watermelons	1,140,000	11,400
Cucumbers	25,000	750
Total value		$4,728,032
Dried—	*Pounds.*	*Value.*
Almonds	84,350	$5,420
Apples	120,000	7,200
Apricots	600,000	40,350
Onions	3,450,500	51,825
Pears	14,741	2,105
Peaches	276,700	9,732
Prunes	977,422	30,809
Raisins	296,000	8,880
Walnuts	148,000	16,775
Totals	5,967,713	$173,096

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	16,000	$12,000
Sweet wines	253,000	185,000
Brandy	61,500	92,500
Totals	330,500	$289,500

Number of wineries, 5; distilleries, 2.

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	5	.....	.....
Skimming stations	22	.....	.....
Cream, gallons		1,280,000	$234,779
Butter		.....	131,131
Condensed milk, gallons		30,000	12,000
Cream, gallons		12,000	19,200
Sweet milk, gals.		1,190,000	35,700
Total value			$432,989

STATISTICS OF RIVERSIDE COUNTY. 1908-9—Continued.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	6,435	$222,890
Stock	5,874	85,092
Dairy cows—Graded	2,230	99,930
Thoroughbred—		
Devon	2	200
Herefords	148	5,980
Holsteins	325	16,110
Polled Angus	130	5,200
Jersey	580	29,200
Common cows	359	9,055
Calves	1,969	10,106
Swine	2,072	13,598
Horses—		
Thoroughbred	8	12,000
Standard-bred	706	157,100
Common	4,897	499,500
Colts	1,159	29,475
Jacks and jennies	2	1,000
Mules	961	124,025
Sheep	6,875	27,250
Angora goats	10	50
Common goats	222	870
Total stock all kinds	34,964	$1,348,722
Wool, pounds	20,000	$2,000

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	5,460	$33,019
Ducks	73	470
Geese	32	242
Turkeys	450	10,635
Eggs	382,720	99,227
Total value		$143,593

Forest Products.

	Amount.	*Value.*
Sawmills, number	2	$36,000
Fuel, wood, cords	3,231	17,386
Lumber, feet	1,500,000	30,000
Eucalyptus trees	225,000	.....
Total value		$83,386

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 17,343	.....	$52,542
Beeswax	4,120	959
Broomcorn	2,160	116
Honey	870,237	48,097
Alfalfa seed	45,495	7,181
Cabbage, plants	120,000	1,200
Total value		$110,095

Manufactories

	No.	*No. of Empl's.*	*Value of Product.*
Bookbindery	1	5	$8,000
Brick	5	69	66,000
Carriages and wagons	4	20	7,500
Cement	1	325	.....
Cigars	2	9	17,750
Confectionery	4	23	58,000
Flouring mill	1	10	25,000
Foundries and iron works	2	48	80,000
Lime	1	3	1,372
Meat products—Hides	3	3	3,613
Olive oil	2	2	18,375
Pickles	2	2	2,800
Pickled olives	2	2	1,200
Sewer pipe	3	28	245,500
Planing mills	3	65	250,000
Potteries and fire brick	2	130	141,000
Artificial stone	3	25	37,500
Granite	2	22	75,000
Marble	2	6	25,000
Miscellaneous	10	50	35,000
Ice	2	25	100,000

Manufactured Output.

	Quantity.
Brick, thousand	1,200
Cigars, thousand	500
Lime, barrels	1,300
Olive oil, gallons	10,000
Pickles, gallons	6,000

SACRAMENTO COUNTY.

Sacramento County is among the largest in the Sacramento Valley. It was organized by the first legislature; within its confines is the seat of State government; the annual fairs of the State Agricultural Society are held near Sacramento City.

Its cities and towns are Sacramento, Folsom, Galt, Elk Grove, Florin, Oak Park, Walnut Grove, Isleton, Franklin, Cosumnes.

The area is almost all a rich alluvial plain from 30 to 75 feet above sea level, gradually rising from the rivers to meet the low rolling foothills of the Sierra Nevada Mountains; these foothills commence at the extreme eastern part, and are from 6 to 8 miles wide. There are no mountains, and aside from this foothill belt the surface has only gentle undulations.

The Sacramento River traverses the western boundary tortuously for about 90 miles across the rich bottoms, cutting them up at the lower part into numerous small and several large islands. The Sacramento is the longest and largest river in the State, and is navigable from Red Bluff to San Francisco Bay.

The American River rises in the upper Sierras, and enters the county at the northeast corner, among the low foothills. It flows in a southwest direction through the entire width, a distance of some 35 miles, and empties into the Sacramento just north of Sacramento City.

Geological indications prove that in remote ages the entire Sacramento Valley and a section of the foothills to an altitude of several hundred feet were portions of the bed of a vast inland sea or lake, and that into this lake the washings of the surrounding mountains were poured to form the present soils, which are made up of all the fertile mineral and vegetable elements in almost inexhaustible quantities. Many analyses have been made of these soils from the alluvial valleys, the upper lands, and the foothills; these analyses have demonstrated that the soils of this valley are unexcelled for fertility.

In addition to the numerous rivers and streams there is, underlying the entire area of the county, an inexhaustible supply of pure and excellent water for domestic and irrigating purposes. Throughout the greater portion this subterranean supply is easily appropriated by means of a light lifting power.

The first venture in agriculture in the Sacramento Valley was by General John A. Sutter in 1839. He received a concession of a large tract of land from the Mexican Government, and located his fort near the junction of the American with the Sacramento River. His first wheat field was a portion of the land now covered by Sacramento City. He planted the first grapevines and fruit trees, and practically demonstrated the unsurpassed fertility of the soil of the great valley in the north.

Thousands of acres along the river bottoms and on the islands are used for the production of all kinds of vegetables, which are shipped

East by the car load and at times by the train load. A great deal of this product is disposed of to the canneries in this and other counties.

Alfalfa grows luxuriantly without irrigation on all the rich bottom lands, producing from four to eight tons to the acre.

Fruits of all kinds are produced on any of the lands of the county, and particularly on the river bottoms and the islands.

The winter fruits are oranges, lemons, pomegranates, olives, and persimmons, which all ripen in November, December, and January. The Japanese persimmons grow to the size of apples. Olives are very profitable, both for pickling and for oil.

The spring fruits that mature and are marketed in April, May, and June embrace strawberries, raspberries, blackberries, and cherries.

At Florin, on the western division of the Southern Pacific Railroad, 9⅓ miles south of Sacramento City, is the most productive strawberry belt in the State. Its product has a reputation for excellence all over the Western States. Tokay grapes from this district are shipped to Eastern markets through the local associations.

Apricots ripen early, and of all countries in the world, California is the only one that has made a thorough success of that fruit, and in this county it reaches its very finest development in size, flavor and productiveness.

A large number of varieties of pears are grown, chief among them the renowned Bartlett.

Plums are very profitable. They grow to large size, and are shipped in vast quantities to the Eastern and home markets.

Nectarines do well, and are cultivated to a considerable extent.

In the fall the fruit products are apples, pears, grapes, quinces, prunes, and peaches.

Sacramento County is preëminently the home of the grape, and on the red lands of the plains it reaches its highest perfection, particularly with irrigation. The table varieties include the Tokay, Muscat, Black Prince, Morocco, Emperor, and Cornichon. They always bring first-class prices for shipment to the Eastern markets. The wineries of the State handle quantities of some of these varieties.

French, or petite, prunes are a leading fruit. They are remarkably prolific, and when cured excel the imported article, and bring a much higher price in the markets of the world.

Figs grow in any part of the county, but on the river bottoms they reach great size, and are remarkably prolific. The Smyrna, or "fig of commerce," has been introduced and successfully grown.

Raisins are easily cured, the climate being peculiarly favorable.

Almonds have long been found a reliable and profitable crop. They can be grown in any part of the county.

The English soft-shell walnut has been demonstrated to be a profitable crop. Black walnut trees are extensively grown for shade and ornament.

Broomcorn is grown, as is also Egyptian corn—the latter making an excellent and cheap food for stock.

Hundreds of tons of beans of all kinds are produced on the river and island lands. The interior of Grand and Tyler islands is to a great degree devoted to their production.

Potatoes, both sweet and Irish, are grown in large quantities on the bottom lands; of the latter, the average yield per acre is from 100 to 150 sacks.

Sacramento City, by reason of natural advantages, geographical relations to various producing sections, and admirable transportation facilities, deservedly bears the reputation of being the largest fruit and vegetable shipping point in the State. It is the recognized outlet for the products of the Sacramento Valley.

The dry atmosphere is specially suited for the drying of fruits, and the article so produced is regarded as first class in the markets of the world.

The California Fruit Canners' Association possesses at Sacramento one of the largest and most modern fruit and vegetable canneries in the world. This cannery is in operation during more months each year than any other in the State, beginning on asparagus the latter part of March, and running steadily for the succeeding eight months, ending the latter part of November on tomatoes and beans.

Sacramento County presents great opportunities to the live stock breeder and the dairyman. The climate is so even, temperate, and mild that animals remain in the open air, practically unsheltered, the year round without hardship. The soil, because of its richness, is peculiarly adapted to the growth of forage crops, especially alfalfa, which is at the same time one of the best and cheapest of stock feeds. There are quite a number of creameries. The average character of the dairy stock is fair, and is being constantly improved by the introduction of well bred animals.

Hogs are raised generally by the farmers, and several breed pedigreed Poland-China, Berkshire, and Essex swine quite extensively. The breeding of pedigreed hogs has been very profitable.

The poultry business has steadily increased in importance in the last few years. Elk Grove, 15 miles south of Sacramento City, on the line of the railroad, and but five miles east of the Sacramento River, is the principal poultry district.

Near Sacramento City the raising of poultry is made a specialty by many, and with profit.

Along the Sacramento, American, and Cosumnes rivers are the most productive hop fields in the United States. Hop culture on this coast dates back to 1858. It was early demonstrated that the soil and climate of Sacramento County are unsurpassed for hop culture, and that it is the only place known where a crop of from 1,000 to 2,000 pounds per acre can be grown the first year the roots are planted. It is a common occurrence to grow 2,000 or 3,000 pounds on an acre of ground, and in some instances 4,000.

There are quite a number of wineries in the county. The output is shipped all over the world, and is principally disposed of in the United States, Central America, and the Islands. The port is not heavy in body nor dark in color, but is rather more delicate and lighter, having great character, and resembling closely the light, high-grade ports of Portugal. The county has a great reputation for fine sherry.

Few counties contain a greater mileage of railroads than does Sacramento. From the capital city the Central Pacific leads eastward across the continent; the California and Oregon passes to the north into

Oregon, and thence to Washington, and also to the Eastern States. At Galt a branch line runs up into the county of Amador; the California Pacific runs on the west of the Sacramento River to Oakland; and the Sacramento and Placerville passes along the American River through Folsom, and thence into the county of El Dorado. From most all of these roads branches extend into the various counties of the Sacramento Valley. The Western Pacific, a new transcontinental line, runs through Sacramento from north to south. From its geographical position Sacramento City is the natural railroad center of the central and northern portions of the State.

Sacramento is promised a fine system of interurban electric roads. The Northern Electric is now extended as far north as Chico, taking in Marysville, Yuba City, Oroville, Gridley, Biggs, and other communities, and will soon include Colusa, Tehama, Red Bluff, and other important towns in the great Sacramento Valley. The Central California is building, and will soon be completed to Stockton and intermediate points, while a franchise for the Vallejo Northern has been granted, and construction for this enterprise will soon be commenced.

The Southern Pacific Company operates two steamboats that make daily trips between Sacramento and San Francisco, touching at the various towns and farm landings to receive and discharge freight. The Sacramento Transportation Company operates eight steamboats and twenty-five barges that are run between Red Bluff and San Francisco. They touch at all landings, and move a great part of the grain that is produced in the up-river counties, as well as all other kinds of freight. The Farmers' Transportation Company is controlled by an association of farmers. Its steamboats run between Colusa and San Francisco, making weekly trips.

Sacramento City, being the center and metropolis of a rich portion of the State, the heart of the vast railroad system, the point from which steamers pass to the north and to the south, and with unlimited water and electrical power at her very doors, presents advantages in manufactures excelled by no other city on the coast. Here are located the extensive shops of the Southern Pacific Company. For years the great power of the swift-flowing American was allowed to go to waste, but in 1888, at the Folsom State Prison, 22 miles from Sacramento City and in the county, a mighty granite dam was constructed across the river. At that point solid bluffs of rock rise on either side, affording a splendid site. The natural fall of the American gives as great a force as any other stream west of the Rocky Mountains, and the artificial assistance rendered by the dam creates added power. From the canal the water falls upon turbine wheels. Five generators produce the electric power, and it is transmited to Sacramento City by four circuits on two sets of poles, so as to guard against breakages and accidents. The distance of the generators from Sacramento is 22.4 miles. The Sacramento Electric, Gas and Railway Company receives and controls this power. Each of the five generators produces 1,000 horsepower. In addition, the company receives current at 40,000 volts from the Bay Counties Company's power plant that is located on the North Yuba, 35 miles above Marysville. This power is transmitted to Sacramento over a circuit 64.2 miles in length. With the combined power so received the street car lines of the company in Sacramento City and suburbs are operated. The light-

ing of the city is from this source. It also furnishes an aggregate of over 3,000 horsepower for manufacturing purposes in and about the city.

The Western Power Company is another company which has just secured rights in Sacramento City.

The Central California Electric Company derives its power from abrupt drops in the canals of the South Yuba Water Company, located in Placer and Nevada counties. The water company has an immense storage system for municipal supply, irrigation, and water power, and maintains twenty reservoirs on the divide, or in the upper foothills, thirteen distributing reservoirs in the lower foothills, and four hundred miles of canal.

The Sacramento Southern, a short line down the river to San Francisco, is about completed, and will open a route to the bay through one of the richest regions in the State.

The natural fish in the rivers are salmon, sturgeon, pike, perch, hardheads, and dace. Those planted are striped bass, black bass, shad, and three kinds of catfish. The only fish propagated is the salmon, in the headwaters of the Sacramento. All of the planted fish have multiplied satisfactorily. In the open season large numbers of salmon and other fish are taken and sold in the local and San Francisco markets.

In the line of game, there are geese, ducks, quail, curlew, doves, and larks. All but the geese are protected. The ducks are mostly migratory. Of the nonmigratory species are the mallard, spoonbill, and wood duck.

One can drive in any direction at any time of the year, with no inconvenience, over roads that favorably compare with the streets in many towns elsewhere in the State. All of the bridges and roads are free for travel.

On the American River, in what is called the Folsom District, dredge mining is being carried on. The area of gravel so far acquired for dredge purposes is about 5,000 acres. These mining operations are in the hands of people with plenty of capital and skilled engineers.

Sacramento City, the capital of California and the county seat of Sacramento County, is situated on the east bank of the Sacramento River. The distance by rail from San Francisco is 90 miles. The imposing State capitol building, that cost about $3,000,000, is one of the finest of its kind in the United States. It stands in the middle of a park of thirty-eight acres, almost in the heart of the city. The Federal building, of red sandstone, costing $150,000, accommodates the post office, the revenue and land offices, and the weather bureau station. The waterworks are the property of the city. The natural gas wells in the city yield an abundance of gas for domestic purposes—heating and cooking.

SAN BENITO COUNTY.

The county extends from the northwest to the southeast for about 60 miles with a general breadth of 20 miles. The Gabilan Mountains on the southwest constitute the dividing line from Monterey County, and at their base flows northerly the entire length the San Benito River. Farther east the Tres Pinos forms another valley.

Irrigation is by gravity from the San Benito River and Tres Pinos Creek. The system is being rapidly improved by the San Benito Land and Water Company. This is supplemented by an extensive system of pumping from an apparently inexhaustible supply of underground flow, and further by artesian wells in the northern end of the county.

The San Juan Portland Cement Company's plant, although nearly completed, is not yet in operation.

The lime industry, though once large, has ceased, awaiting better transportation facilities.

The quicksilver product of the New Idria mines goes on unceasingly. Furnaces are being erected at two new mines, "The Esmeralda" and Bradford.

Large deposits of potter's clay of superior quality lie easy of access, as also sandstone and lime rock quarries.

Gypsum is mined in the southern end of the county and a large rock-crushing plant is established in the northern end.

Much development work for petroleum is going on in the southeastern end of the county, with flattering prospects.

STATISTICS OF SAN BENITO COUNTY, 1908-9.

General Statistics.

Area, 1,056 square miles, or 676,000 acres.	
Number of farms	1,250
Number of acres assessed	576,000
Value of country real estate	$3,970,685
Of improvements thereon	$700,045
Of city and town lots	$357,495
Of improvements thereon	$513,220
Of personal property	$1,391,305
Total value of all property	$6,932,740
Expended on roads, last fiscal year	$17,807
Expended for bridges, last fiscal year	$500
Number of miles of public roads	414
Road levy per $100, 1909	33c
Value of county buildings	$128,000
Irrigating ditches—miles, 50; cost	$75,000
Number of acres irrigated	4,000

Railroad, steam—miles, 24.45; electric power plants, 1; electric power lines—miles, 15.2.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens, marketed	3,780	$18,000
Ducks	132	650
Geese	12	150
Turkeys	150	4,000
Eggs	708,960	208,500
Total value		$231,300

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	2,150	1,076	$38,735
Barley	11,100	8,078	193,875
Oats	200	111	4,880
Corn	30	10	250
Total cereals	13,480	9,275	$237,740
Alfalfa hay	1,500	4,500	$45,000
Grain hay	40,000	56,200	730,000
Total hay	41,500	60,700	$775,000

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	88,000	$25,650
Beer, barrels	1,750	13,000
Brandy	1,000	300
Whisky	250	50

Number of wineries, 2; distilleries, 1; breweries, 1.

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	1	.....	.....
Cream, gallons		542,000	$56,000
Butter, pounds		283,500	56,580
Cheese, pounds		398,000	59,570
Condensed milk, cases		10,407	34,820

STATISTICS OF SAN BENITO COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	17,000	1,000	18,000
Apricot	36,000	2,000	38,000
Cherry	2,200	.....	2,200
Peach	13,000	2,000	15,000
Pear	7,000	500	7,500
Prune	125,000	20,000	145,000
Total fruit trees	200,200	25,500	225,700
Almond	4,650	.....	4,650
Walnut	400	400	800
Total nut trees	5,050	400	5,450

Grapevines, all kinds, 435 acres; bearing, 305,000.

Berries, acres, all kinds, bearing, 125; nonbearing, 10.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	1,400,000	$19,750
Apricots	895,475	14,700
Blackberries	25,000	1,000
Beets	5,000	50
Cabbage	120,000	1,500
Cauliflower	5,000	500
Corn	100,000	2,000
Cherries	90,000	4,100
Grapes, table	150,000	1,500
Loganberries	131,000	5,400
Pears	994,900	24,800
Peaches	758,400	7,800
Plums	125,000	3,000
Irish potatoes	1,080,000	13,500
Raspberries	31,000	1,550
Strawberries	1,100,000	35,000
Tomatoes	4,000,000	35,000
Squash	1,800,000	2,250
Total value		$173,400
Dried—	*Pounds.*	*Value.*
Almonds	102,000	$10,000
Apricots	1,200,000	96,000
Cherries	1,922	125
Onions	372,000	2,720
Peaches	300,000	18,000
Plums	4,800,000	120,000
Walnuts	40,000	4,800
Silver prunes	150,000	6,000
Apricot pits	54,000	600
Total value		$258,245

Live Stock Industry.

	Number.	Value.
Cattle—Beef	7,000	$240,000
Stock	12,105	160,000
Dairy Cows—Graded	2,220	55,530
Thoroughbred—		
Shorthorns	80	5,000
Calves	5,822	43,665
Swine	3,190	8,870
Horses—Thoroughbred	35	7,600
Common	4,032	164,010
Colts	1,777	37,690
Jacks and jennies	1	150
Mules	40	2,100
Sheep	14,232	28,465
Lambs	5,585	5,585
Common goats	45	45
Burros	5	35
Total stock all kinds		$758,750
Wool, pounds	126,265	$19,000

Forest Products.

	Amount.	Value.
Fuel, wood, cords	4,500	$36,000

Power used for mills, manufactories, and pumping in county—steam, 14; water, 1; gasoline, 18.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 400	.....	$400
Honey	12,000	1,000
Garden seed	758,225	138,500
Sugar beets, tons	5,371	22,825
Veal, dressed	77,400	5,000
Hogs, dressed	70,000	5,600

Manufactories.

	No.	No. of Empl's.	Value of Product.
Cigars	2	5	$13,000
Confectionery	3	5	5,000
Meat products—			
Hides		.....	14,200
Lard		.....	5,000
Meat packed		.....	4,000
Tallow		.....	900
Planing mills	1	3	6,000

Manufactured Output.

	Quantity.
Cigars	370,000

SAN BERNARDINO COUNTY.

San Bernardino is not only the largest county in California, but it is the largest in the United States. It is larger than New Hampshire, Vermont, and Rhode Island combined; larger than New Jersey, Delaware, Massachusetts, and Rhode Island combined; very nearly as large as Massachusetts, Connecticut, and New Jersey. There are eight states whose area is less than that of this county.

San Bernardino County is in the southeastern part of the State. The greater portion is desert. In the north is the Mojave Desert, and in the east the northern end of the Colorado Desert, the arable portion being confined to the southwestern part—the San Bernardino Valley. This valley forms an almost perfect amphitheater, encircled by mountains and hills, open only on the west, allowing the sea breeze from the ocean to sweep its entire length.

Mount San Gorgonio is perpetually snow-capped, and from it is derived much of the water used for irrigation in the summer in the valley below, the remainder coming from the mountain range, giving a bountiful supply for irrigators. The combined waters of the streams, springs, and artesian wells make this valley one of the best watered in southern California.

The forests on the mountain ranges furnish the supply of lumber and timber used in the valley.

Mount San Bernardino, from its distinctive cone, has been adopted by the United States surveyors as the initial point for land surveys in southern California, both base and meridian starting from its peak.

The northern and eastern parts of the county are almost absolutely sterile. Yet, along the Mojave River, where it debouches from the mountains to the desert, and for many miles, the land on both sides is fertile, easily worked, and produces abundantly as long as the water supply is available.

The soil of San Bernardino Valley varies greatly with locality. In the eastern part it is a sharp gravel or sand, with a large admixture of alluvial deposits. West the soil changes to a heavy, dark loam, with occasional patches of adobe. Still farther west, the soil is of a lighter character, and possesses much more of the soda and potash constituents. Immediately about the city of San Bernardino the soil is a strong adobe, with appearances here and there of soda salts. Along the river bottoms the soil is a heavy clay, and in some places a black adobe. It is cold and damp, and not as suitable for fruit culture as for grazing and the growing of hay.

The rainfall varies a great deal, as does the climate. Passing from the lower levels to the high altitudes the rainfall increases. On the north and east of the mountain ranges, on the Mojave and Colorado deserts, the larger portion of the rainfall comes in July and August, with no rains during the winter. The rains are short, sharp, and heavy, frequently accompanied by thunder and lightning, which latter is almost unknown south of the mountains.

In the number and character of irrigation enterprises, the county stands in the front rank. It has been justly called the "Mother of Irrigation," because here was dug the first irrigation ditch in the State, and here were raised the first crops by irrigation. It is over a hundred years since the mission fathers of San Gabriel established an outlying post, or submission, just west of Redlands, and employed Indian labor to dig what is known as the zanja. This ancient ditch is still in use and within the same banks that were first thrown up by Indian labor almost a century ago.

There are hundreds of miles of canals and pipe lines, with thousands of miles of laterals and individual pipe lines. In addition to this, hundreds and hundreds of wells have been bored, each producing a flowing stream without other or further expense, which volume is sufficient not only to irrigate many thousands of acres, but also furnishes the magnificent supply which fructifies and renders fertile the great plain on which the city of Riverside stands.

Almost every variety of fruit can be produced in some part of this county. The only exceptions are those strictly tropical. In the mountain valleys and upon the upper plateaus, apples and cherries are grown. On the lower levels, all the deciduous fruits are produced. The production of oranges, lemons, and pomelos is large, these fruits being grown to perfection. The production of oranges has increased rapidly during the last few years. The first plantings of orange trees were two set out by Anson Van Leuven in his dooryard in Old San Bernardino in the early sixties, and by M. H. Crafts at Crafton, at about the same time or a little later.

In the western part of Rialto, Etiwanda, and Cucamonga neighborhoods there is produced a large quantity of raisins. Another section of the county especially adapted to the culture of grapes is that about Hesperia, which lies along the Mojave River.

In the southwest corner of the valley is located the Chino Ranch, on which is the third largest beet-sugar factory in the world. The acreage devoted to sugar-beet culture is in the neighborhood of 20,000. The factory has a capacity of about 12,000 tons of refined sugar annually. The culture of sugar beets has been a profitable industry for the farmers. On this ranch are fattened thousands of head of cattle upon the beet pulp, which is siloed for that purpose.

Along the slope of the mountains, and in the mountain valleys and canyons, are numerous bee ranches, from which is produced a large amount of honey.

The raising of cattle and sheep is carried on along the mountain ranges and in the upper mountain valleys. Several large bands of sheep are grazed on the ranges. Dairying is carried on in both the upper and lower valleys. Pure-bred or grades of high-class dairy cattle are in general use. A stock company for the breeding of the most desirable classes of horses has a large ranch at Victor to be devoted exclusively to their raising.

Wheat, oats, and barley are grown in considerable quantities, and alfalfa is raised with profit.

Vegetables of nearly all descriptions are raised, the yield being large, and a growing shipping trade to outside markets has been established.

The northern and eastern portions are heavily mineralized, and

although prospecting has been carried on for fifty years, new and greater finds are being made every year. Almost every known mineral has been discovered. Gold, silver, copper, iron, tin, lead, borax, soda, and nitrates are found in abundance and scattered over a wide area. Some of the richest silver mines in the State are in this county. Copper exists in great abundance. The high cost of freight; the scarcity of water, which renders the life of the prospector precarious, as well as interfering with the working of the mines; the scarcity and high cost of fuel—all combined have limited prospecting and retarded mining development. The building of railroads across the desert has partially removed some of these obstacles, and mining recently has been prosecuted with more vigor.

STATISTICS OF SAN BERNARDINO COUNTY, 1908-9.

General Statistics.

Area, 20,160 square miles, or acres.	12,902,400
Number of farms	5,425
Number of acres assessed	783,986
Value of country real estate	$14,810,630
Of improvements thereon	$6,446,985
Of city and town lots	$3,806,015
Of improvements thereon	$4,816,945
Of personal property	$2,858,220
Total value of all property	$32,738,795
Expended on roads, last fiscal year	$154,338
Expended for bridges, last fiscal year	$33,230
Number of miles of public roads	2,100
Road levy per $100, 1909	45c
Value of county buildings	$460,000
Irrigating ditches—miles, 435; cost	$3,857,000
Railroads, steam—miles, 920; assessed value	$12,641,077
Railroads, electric—miles, 51; assessed value	$184,070
Electric power plants—5; power lines—miles, 195; assessed value	$1,060,337
Number of acres irrigated	47,500

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	515,000	$54,850
Sweet wines	570,000	91,600
Brandy	96,000	25,800
Vinegar	40,000	3,000
Grape juice		10,000
Total value		$185,250

Number of wineries, 12.

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	287,000	
Cedar, acres	28,000	
Pine, acres	259,000	
Sawmills, number	3	$50,000
Charcoal, sacks	4,500	1,800
Fuel, wood, cords	13,000	71,500
Lumber, feet	10,200,000	193,800
Sash and door factories		17,000
Total value		$334,100

Power used for mills and manufactories in county—Steam, 38; water, 5; electrical, 14; gasoline, 10.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	2,780,000	$97,500
Apricots	5,800,000	47,800
Blackberries	88,500	8,950
Beans		34,000
Beets		26,000
Cabbage		78,000
Corn		38,000
Cherries	200,000	12,400
Figs	16,000	1,550
Grapes	108,000,000	383,500
Grape fruit, boxes	20,900	48,070
Lemons, boxes	347,100	748,000
Loganberries	18,000	1,900
Nectarines	118,750	3,550
Onions	150,000	2,750
Oranges, boxes	4,037,000	6,136,340
Olives	550,000	14,500
Pears	925,000	24,350
Peaches	9,600,000	74,500
Peas		24,000
Plums	160,000	4,000
Irish potatoes	356,000	43,500
Sweet potatoes	30,000	650
Prunes	520,000	2,150
Raspberries	16,000	1,600
Strawberries	163,000	13,150
Tomatoes	2,000,000	8,000
Melons	900,000	5,200
Total value		$7,883,910

Dried—	*Pounds.*	*Value.*
Almonds	4,500	$700
Apricots	728,000	52,780
Figs	2,500	375
Onions	30,000	500
Peaches	550,000	20,625
Prunes	92,000	2,050
Raisins	3,600,000	66,000
Walnuts	200,000	2,600
Total value		$145,630

Canned—	*Cases.*	*Value.*
Apricots	30,000	$63,000
Cherries	500	1,950
Pears	500	1,400
Peaches	93,600	187,200
Plums	600	1,050
Miscellaneous	15,000	28,500
Total value		$283,100

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	3		
Butter, pounds		340,000	$102,000

STATISTICS OF SAN BERNARDINO COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	18,300	2,100	20,400
Apricot	28,700	.....	28,700
Cherry	13,200	.....	13,200
Fig	2,650	.....	2,650
Lemon	220,200	2,000	222,200
Nectarine	2,375	.....	2,375
Olive	54,000	.....	54,000
Orange	3,025,300	150,000	3,175,300
Peach	10,375	.....	10,375
Pear	18,500	.....	18,500
Plum	2,500	.....	2,500
Prune	2,800	.....	2,800
Other kinds	7,500	.....	7,500
Total fruit	3,406,400	154,100	3,560,500
Almond	1,200	.....	1,200
Walnut	6,300	1,275	7,575
Total nut	7,500	1,275	8,775
Grapevines	17,690	82,000	25,890
Berries, acres	75	.....	75

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	850	190	$5,700
Barley	6,800	3,360	81,900
Oats	100	75	2,650
Corn	2,500	1,200	38,400
Total cereals	10,250	4,825	$128,650
Alfalfa hay	5,100	36,400	$408,600
Grain hay	25,000	28,800	362,400
Straw	.....	1,000	6,000
Total value			$777,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	7,500	$37,500
Ducks	100	600
Geese	50	500
Turkeys	750	11,250
Eggs	770,000	207,900
Total value		$257,750

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 12,000	.....	$36,000
Beeswax	6,000	1,500
Flowers and plants, acres	178	152,000
Honey	600,000	30,000
Alfalfa seed	8,000	1,200
Syrup, gallons	.....	2,100
Sugar beets, tons	30,000	158,000
Gold	.....	243,000
Silver	.....	30,000
Copper	.....	20,000
Lead	.....	40,000
Soda	.....	100,000
Crushed rock	.....	135,000
Marble dust	.....	12,500
Plaster	.....	41,500
Tungsten	.....	30,000
Paving blocks	.....	35,000
Total value		$1,067,800

Live Stock Industry.

	Number.	Value.
Cattle—Beef	8,500	$240,150
Stock	6,800	150,000
Dairy cows—Graded	1,950	77,550
Calves	1,700	17,000
Swine	5,800	69,500
Horses—		
Thoroughbred	65	65,000
Standard-bred	250	62,000
Common	14,000	1,260,000
Colts	1,200	24,000
Mules	450	22,500
Sheep	25,000	100,000
Total value		$2,087,700
Wool, pounds	55,000	$4,330

Manufactories.

	No.	No. of Empl's.	Value of Product.
Bookbindery	1	2	$4,000
Wood boxes	3	55	181,000
Brick	3	9	19,500
Cement	1	200	720,000
Cigars	5	10	22,000
Clothing	12	36	65,000
Confectionery	10	24	59,500
Electrical supplies	1	150	225,000
Flouring mill	1	26	400,000
Foundries and iron works	7	57	185,000
Leather goods	4	11	25,000
Lime and limestone	..	....	150,000
Machinery	..	....	537,450
Meat products—			
Hides	..	....	39,065
Lard	..	....	13,795
Meat packed	..	....	8,400
Tallow	..	....	14,700
Olive oil	..	....	22,500
Pickled olives	..	....	17,500
Sewer pipe	8	20	24,000
Planing mills	9	45	155,000
Pottery	1	1	1,700
Soap	1	1	500
Artificial stone	3	4	13,000
Oil refinery	1	....	625,000
Granite	..	....	4,500
Marble	..	....	35,000
Sandstone	..	....	3,000
Sugar, beet	..	....	1,265,000
Tin and galvanized iron	15	42	103,000
Miscellaneous	..	....	75,000
Feed mills	..	....	392,000
Fertilizer	..	....	400,000
Ice	..	....	473,000
Total value			$6,279,110

Manufactured Output.

	Quantity.
Brick, thousand	3,150
Cement, tons	72,000
Cigars, thousand	440
Flour, barrels	80,000
Hides, pounds	431,500
Lard, pounds	106,100
Meat packed, pounds	60,000
Tallow, barrels	735
Olive oil, gallons	15,000
Pickled olives, gallons	35,000
Soap powder	24,000

SAN DIEGO COUNTY.

San Diego County occupies the southern part of the State, and has an area slightly larger than Massachusetts. The Pacific Ocean washes its shores for upward of 75 miles. The land rises gently from the ocean for a distance of about 50 miles to a chain of peaks forming the backbone of the county, descending again quite rapidly to the Colorado River Valley, the greater part of which is below sea level.

The arable portion of the western slope is divided into a series of irregular terraces or plateaus. The lower or coast terrace comprises a number of valleys with the intervening mesa. This large acreage is practically frostless. Next come a series of higher valleys, Poway Valley, varying in elevation from 400 to 500 feet. The third terrace, the altitude of which ranges from 1,000 to 2,500 feet, comprises the foothill region, with numerous smaller intervening valleys, nooks and glens. Next comes the mountain region. The area of tillable land in these valleys and mesas is approximately 600,000 acres, a still larger area being suited to pasturage and grazing. The elevation of the mountain valleys varies from 2,500 to 4,500 feet. They are chiefly devoted to stock raising, but many of them are well adapted to the growing of small fruits and vegetables and to diversified farming.

The arable soil of the county may be classed under two heads: granitic and adobe; though there is often a mixture of both, resembling adobe.

The intermountain region, the hills and valleys between the plains of Imperial and the western slope of the county, is rich in minerals, and affords excellent pasturage for several thousand cattle. The mineral wealth of San Diego County, though known to be great, is largely undeveloped, and offers an excellent field for the prospector and capitalist. Lepidolite and amblygonite, containing lithia and other valuable products, exist in greater quantities than in any other known deposit in the world. San Diego is producing the finest tourmaline in the United States. The crystals are of exceptional hardness, possess exquisite delicacy of coloring, and when cut form gem-stones of great brilliancy. Kunzite, a new gem, not found in any other part of the world, was recently discovered at Pala, and is attracting a great deal of attention. Gem experts are manifesting a deep interest in the remarkable crystallizations found in San Diego County.

According to a bulletin on the "Climatology of California," recently published by the U. S. Department of Agriculture, San Diego County has the heaviest and most reliable rainfall of any part of southern California. The rainfall increases, and greater extremes of temperature occur, as you leave the coast, the higher mountain peaks being often covered with snow to quite a depth during a part of the winter.

Water is impounded mainly for the citrus orchards of the coast section, the higher valleys requiring but little or no irrigation for their crops of cereals, deciduous fruits, olives, vegetables, etc.

As an evidence that education keeps pace with the population, there are more than one hundred and fifty schoolhouses distributed through the county, the instruction in which is up to the usual high standard found throughout California.

The board of supervisors has done and is doing good work in the way of road building, the most distant and mountainous places being readily reached over excellent highways.

The orange, lemon, and pomelo, or grape fruit, do well. The largest single lemon grove contains about 800 acres.

Raisin grapes are a profitable crop, and the industry has a bright future. The wine industry is large and growing.

Olive growers are making money. An olive grove, to be a commercial success, should be set out with a view to supplying pickling fruit, oil olives being treated as a by-product. The demand for pickled ripe olives is already in excess of the supply, and steadily growing.

Peaches, apricots pears, quinces, plums, cherries, and other deciduous fruits do well. The mountain region around Julian has attained a special reputation for the crisp, finely flavored apples.

A good walnut orchard, properly located with reference to soil and water, is a safe investment. Small areas well suited to this crop may be found in different parts of the county—notably in the Tia Juana Valley. Almonds do well, and there are some thriving orchards.

San Diego County is celebrated for its deliciously perfumed and fine-flavored honey, which always finds a ready market at top prices. The apiaries are located for the most part among the hills and valleys back from the coast.

There is reason to believe that the cultivation of the silkworm may hold a most important part in the industrial development of San Diego County—the climatic conditions are so perfectly adapted to the delicate constitution of the worm, and the foliage of the mulberry may be had in such wholesome condition practically during the entire year. Many acres have been set out to mulberry trees, and those interested feel greatly encouraged over the outlook.

The dairy industry has shown a healthy growth, having trebled in the past four years.

The modern city of San Diego was founded by A. E. Horton in 1867. The situation is not only sanitary and attractive, but it is also admirably adapted for a large ocean commerce. Numerous wharves extend into deep water, and in their neighborhood may be found lumber yards, planing mills, warehouses, foundries, etc. The electric street railway system is equipped with modern cars and complete in every respect. Water is provided in abundance, the supply and distribution being controlled by the municipality. The streets of the city are well lighted by electricity. The schools, private and public, have an excellent reputation. A fine, large opera house, perfect in its appointments, is on the circuit of the very best theatrical and operatic companies. There are also several smaller theaters. The different religious organizations worship in attractive edifices; secret societies and benevolent associations have their lodge rooms, and numerous musical and literary clubs are supported by an active membership. There are several strong banking institutions. The hotel accommodations are excellent, and there are a number of sunny modern lodging houses. San Diego is thrown into

special prominence as being the first port of call on the Pacific coast of the United States north of Panama, and the magnificent bay, around the shores of which the city is built, will soon become an important naval rendezvous. The Government has concluded arrangements for the erection of a large coaling station here, and is fast completing the building of a modern military post at Fort Rosecrans, the big guns of which command the entrance to the bay.

Just across the bay from San Diego, ten minutes by ferry, is the peninsular city of Coronado, with its world-famous Hotel del Coronado and many beautiful homes.

National City, the second largest city, is situated on the southeast shore of the bay. The land here rises gently from the water front, and is admirably suited for the location of manufacturing establishments or other plants requiring a comparatively large area of level ground with good water frontage. There are a number of attractive homes within the city limits and nestling among the lemon and orange groves in the fertile valleys near by. The church and school facilities of the place are excellent. A large manufactory of citrus products is in successful operation, turning out citric acid, oil of lemon, lemon extracts, etc. There is also an olive oil factory, and its product is equal to the best.

Passing through Old Town, you come to Pacific Beach, a very attractive suburb of San Diego. The land is quite level near the ocean, affording one of the widest, smoothest, hardest, and most attractive beaches along the coast.

Escondido is some 35 miles northeast of San Diego, being connected by spur with the main line of the Southern California Railway. A large area of productive country is tributary to Escondido, from which are made shipments of hay, grain, cattle, hogs, oranges, lemons, raisins, wine, honey, chickens, eggs, butter, etc. The school and church accommodations of the place are excellent.

STATISTICS OF SAN DIEGO COUNTY, 1908-9.

General Statistics.

Area, 4,209 square miles, or 2,693,760 acres.	
Number of farms	5,727
Number of acres assessed	1,301,111
Value of country real estate	$5,539,346
Of improvements thereon	$960,384
Of city and town lots*	$20,609,988
Of improvements thereon	$4,005,921
Of personal property	$4,210,532
Total value of all property	$35,334,171
Expended on roads, last fiscal year	$56,335
Expended for bridges, last fiscal year	$4,173
Number of miles of public roads	5,200
Road levy per $100, 1909	60c
Value of county buildings	$551,500
Irrigating ditches and flumes†—miles, 133; cost	$3,420,000
Railroads, steam—miles, 197.20; assessed value	$2,547,855
Railroads, electric — miles, 48.93; assessed value	$304,742
Electric power plants—4; assessed value	$58,900
Electric power lines—miles, 2; assessed value	$55,200
Number of acres irrigated†	14,775

*Exempt personal, $467,996.
†Estimated.

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	63,860	27,850	91,710
Apricot	49,110	2,200	51,310
Cherry	5,745	725	6,470
Fig	15,700	2,100	17,800
Lemon	271,000	34,600	305,600
Olive	231,600	24,000	256,600
Orange	107,000	4,200	111,200
Peach	93,200	40,100	133,300
Pear	17,850	10,000	27,850
Plum	11,750	9,000	20,750
Prune	87,360	4,000	91,360
Pomelo	17,000	2,350	19,350
Total fruit.	971,175	161,125	1,132,300
Almond	8,380	1,000	9,380
Walnut	7,000	2,700	9,700
Total nut...	15,380	3,700	19,080
Grapevines	2,288,000	549,500	2,837,500
Berries, acres.	185	10	195

Fish Industry.

	Pounds.	*Value.*
All kinds	2,976,740	$148,837

Employees, 118.

STATISTICS OF SAN DIEGO COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples, 2½c	2,500,000	$62,500
Apricots, 3c	1,600,000	48,000
Blackberries, 4c	300,000	12,000
Beans	3,340,000	116,900
Cabbage, 1c	500,000	5,000
Cucumbers, 1½c	20,000	300
Cauliflower, 4c	150,000	6,000
Corn, 1½c	2,000,000	30,000
Cherries, 5c	200,000	10,000
Figs, 3c	16,000	480
Grapes, 1c	3,000,000	30,000
Grape fruit	600,000	9,000
Lemons, 1,556 cars	491,712	1,106,352
Loganberries, 4c	10,000	400
Onions, 1¼c	250,000	3,125
Oranges, 301 cars	97,719	156,510
Olives	3,700,000	157,250
Pears, 3c	103,250	3,097
Peaches, 2c	1,000,000	20,000
Peas, 5c	310,000	15,500
Persimmons, 4c	20,000	800
Plums, 3c	100,000	3,000
Irish potatoes, 1¼c	6,018,000	75,225
Sweet potatoes 1½c	300,000	4,500
Prunes, 2c	200,000	4,000
Quinces, 3c	2,000	60
Strawberries, 4c	2,000,000	80,000
Tomatoes, 1c	550,000	5,500
Rhubarb, 3c	18,000	540
Total value		$1,966,039

Dried—	*Pounds.*	*Value.*
Almonds, 13c	60,000	$7,800
Apricots, 8c	220,000	17,600
Peaches, 5c	30,000	1,500
Prunes, 4c	30,000	1,200
Raisins, 60 cars	3,200,000	96,000
Walnuts, 12½c	100,000	12,500
Totals	3,640,000	$136,600

Canned—	*Cases.*	*Value.*
Olives, ½ pints	200	$1,000
Olives, pints	3,500	17,500
Olives, quarts	6,300	30,240
Olives, gallons	600	3,600
Olives, gallons, bulk	5,000	2,500
Total value		$54,840

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	7,352	2,480	$74,400
Barley	29,876	11,502	333,558
Oats	7,550	2,716	108,640
Corn	2,209	1,104	27,600
Total cereals	46,987	17,802	$544,198
Alfalfa hay	1,617	6,468	$109,956
Grain hay	88,856	88,856	1,688,264
Grass hay	3,500	3,500	45,500
Total hay	93,973	98,824	$1,843,720

Dairy Industry.

	Production.	*Value.*
Butter, pounds. 32c	700,000	$224,000
Cream, gallons	7,000	7,000

Dairies, 250; creameries, 3; skimming stations, 4.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	11,100	$555,000
Stock	38,500	1,155,000
Dairy cows—Graded	1,000	50,000
Common	11,800	413,000
Thoroughbred—Angus	80	8,000
Devon	225	11,150
Herefords	10	500
Jersey	200	10,000
Calves	13,400	134,000
Swine	11,000	110,000
Horses—Thoroughbred	100	20,000
Standard-bred	2,000	250,000
Common	8,600	516,000
Colts	2,000	50,000
Jacks and jennies	40	3,200
Mules	1,250	168,700
Sheep	10,300	56,650
Lambs	4,200	12,600
Common goats	600	1,500
Total stock all kinds	116,405	$3,525,300
Wool, pounds	100,000	$25,000
Mohair, pounds	125,000	12,500

Poultry and Eggs.

	Dozen.	*Value.*
Chickens, $7	30,500	$213,500
Ducks, $6.50	1,500	9,750
Geese, $18	500	9,000
Turkeys, $27	1,200	32,400
Eggs, 35c	1,225,400	428,890
Total value		$693,540

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	43,260	$540,750
Cedar, acres	2,000	
Pine, acres	17,200	
Oak, acres	23,060	
Fir, acres	1,000	
Fuel, wood, cords	2,500	15,000
Eucalyptus trees (1,000,000), acres	5,000	100,000
Total value		$655,750

Power used for mills and manufactories in county—Steam, 178; electrical, 350; gasoline, 100.

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	520,000	$156,000
Sweet wines	180,000	90,000
Vinegar	1,800	1,170
Beer, barrels	48,000	384,000
Brandy	6,000	4,500

Number of wineries, 5; distilleries, 4; breweries, 1.

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 55,000	.....	$165,000
Beeswax	25,000	6,000
Flowers and plants, estimate	.....	80,000
Honey	1,597,500	87,862
Mineral water, cases	8,500	63,750

STATISTICS OF SAN DIEGO COUNTY, 1908-9—Continued.

Manufactories.

	No.	No. of Empl's.	Value of Product.
Bookbinderies	2	10	$10,000
Wood boxes	1	6	18,000
Brick	3	69	91,125
Brooms	1	4	9,600
Cigars	3	75	216,000
Coffee, spices, etc.	2	18	186,000
Confectionery	5	49	196,000
Foundries and iron works	8	162	196,000
Furniture	1	4	20,000
Jewelry	3	18	32,000
Leather goods	1	6	7,000
Meat products—			
Hides, 15c	5	16	96,000
Lard	..	....	8,400
Meat packed	..	....	37,500
Tallow	..	12	30,000
Olive oil	4	30	79,800
Show cases	2	13	33,000
Cement	1	20	30,000
Planing mills	7	130	430,000
Salt	2	60	132,000
Soap	1	15	8,400
Artificial stone	2	30	80,000
Crushed rock	3	56	221,000
Granite	3	19	31,500
Precious stones, cut	8	20	72,132
Gems, rough	5	25	415,085

Manufactories—Continued.

	No.	No. of Empl's.	Value of Product.
Tin and galvanized iron	5	48	107,000
Citrus wash. powder	1	15	48,000
Sal soda	..	....	1,800
Sawmill	1	50	360,000
Rubber stamp	1	2	4,000
Onyx	1	20	120,000
Fuel companies	1	10	18,000
Tent and awning	2	13	40,000

Manufactured Output.

	Quantity.
Brick, thousand	12,150
Brooms, dozen	2,400
Cigars, thousand	3,635
Hides, pounds	640,000
Lard, pounds	70,000
Meat packed, pounds	300,000
Tallow, barrels	1,500
Olive oil, gallons	10,000
Salt, tons, estimate	12,000
Soap, pounds	200,000
Smoking tobacco, pounds	10,000
Citrus wash. powder, pounds	720,000
Sal soda	180,000
Lumber cut per day, feet	60,000

SAN JOAQUIN.

San Joaquin County lies directly east of San Francisco and San Pablo bays and spans the great interior valley of California from the foothills of the Coast Range to the foothills of the Sierra Nevada Mountains. It thus commands the entrance to the chief port and metropolis of the coast from the continental area for both water and land traffic; hence it is termed the "Gateway County." It embraces most of the famous San Joaquin delta within its limits. The soil varies in character, but the land is mostly level and well adapted to intensive agriculture. The climate of this area is tempered by sea influences, through the air which rushes through the gap in the Coast Range. The products are wonderfully diversified, and from its rank ten years ago as the leading wheat county in the West, it has progressed to a system of mixed agriculture and special farming, and is now distinguished as a producer of hay, barley, potatoes, grapes, garden vegetables, orchard fruits, beans, onions, asparagus, and dairy products, poultry and celery.

The county has 400 lineal miles of navigable waterways, four transcontinental railroads, and has voted nearly $2,000,000 for the construction of 238 miles of permanent highways. Its transportation facilities are, consequently, unexcelled. Stockton, its county seat, is a city of 25,000 people, a commercial and manufacturing center and the metropolis and distributing point for the San Joaquin Valley.

Within the past ten years the number of farmers in San Joaquin County has increased from 1,966 to 5,315, and the number of farms under 100 acres each in extent, has increased from 699 to 3,296; striking evidence of the transition from pastoral and grain raising conditions to intensified agriculture. The county has no debt except for the improved roads which are now in process of construction. It has $747,000 invested in fine buildings. Agriculture and manufacturing are very prosperous and make trade active at Stockton, Lodi and other shipping points.

STATISTICS OF SAN JOAQUIN COUNTY, 1908-9.

General Statistics.

Area, 1,365 square miles, or 873,600 acres.	
Number of farms	5,315
Number of acres assessed	870,400
Value of country real estate	$16,677,957
Of improvements thereon	$2,755,387
Of city and town lots	$7,203,384
Of improvements thereon	$7,106,300
Of personal property	$5,463,600
Total value of all property, plus 15% added by State Board of Equalization	$45,087,618
Expended on roads, last fiscal year	$107,443
Expended for bridges, last fiscal year	$42,892
Number of miles of public roads	1,200
Road levy per $100, 1909	40c
Value of county buildings	$747,000

General Statistics—Continued.

Irrigating ditches—miles, 83; cost	$1,750,000
Railroads, steam—miles, 226; assessed value	$4,603,249
Railroads, electric—miles, 28; assessed value	$271,757
Electric power plants—2; assessed value	$23,038
Electric power lines—miles, 77.75; assessed value	$51,077
Number of acres irrigated	268,000

Forest Products.

	Amount.	*Value.*
Fuel, wood, cords	11,000	$66,000

Power used for mills and manufactories in county—Steam, 21; electrical, 72; natural gas, 11; gasoline, 16.

STATISTICS OF SAN JOAQUIN COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

Green—	*Value.*
Apples	$9,200
Apricots	39,643
Asparagus, 4,500 acres	675,000
Blackberries	22,400
Beans, 16,000 acres	744,000
Beets	10,250
Cabbage	24,410
Celery, 310 acres	87,000
Cauliflower	13,620
Corn	12,980
Cherries	230,400
Figs	6,750
Gooseberries	532
Grapes	1,430,000
Lemons, boxes	2,150
Loganberries	4,670
Nectarines	1,250
Onions	520,000
Oranges	11,860
Olives	47,600
Pears	32,607
Peaches	389,676
Peas	26,890
Plums	17,498
Irish potatoes, 2,375,000 sacks	2,137,500
Sweet potatoes	16,230
Prunes	70,104
Quinces	3,416
Raspberries	2,400
Strawberries	15,660
Tomatoes	25,945
Melons, 1,200 acres	60,000
Other vegetables	75,000
Total value	$6,766,641

Dried—	*Value.*
Almonds	$135,000
Apricots	30,000
Chestnuts	510
Figs	8,400
Peaches	62,750
Peanuts	5,150
Prunes	53,200
Walnuts	7,600
Total value	$302,610

Canned—	*Cases.*	*Value.*
Apples	1,500	$4,500
Figs	200	500
Grapes	3,000	6,000
Pears	10,000	25,000
Peaches	80,000	240,000
Plums	3,000	7,500
Asparagus	24,000	108,000
Totals	125,700	$391,500

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	1,500,000	$135,000
Sweet wines	2,500,000	375,000
Beer, barrels	1,510,000	377,500
Brandy	160,000	40,000

Number of wineries (110), 5 large and 105 small; distilleries, 6; breweries, 2.

Fish Industry.

	Value.
Miscellaneous	$32,000

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	2	.....	.....
Skimming stations	40	.....	.....
Butter, pounds		2,350,000	$587,500
Milk sold or consumed locally		.....	375,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	36,420	18,544	$772,675
Barley	106,275	109,311	2,896,741
Oats	32,141	25,613	665,938
Rye	1,684	907	20,024
Corn	2,540	3,429	120,015
Total cereals	179,060	157,804	$4,475,393
Alfalfa hay	28,016	140,080	$1,400,800
Grain hay	123,703	164,987	2,062,337
Grass hay	2,000	2,200	24,000
Total hay	153,719	307,267	$3,487,137

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	13,250	1,976	15,226
Apricot	69,839	3,267	73,106
Cherry	38,418	9,158	47,576
Fig	7,207	1,349	8,556
Lemon	1,721	330	2,051
Nectarine	1,642	563	2,205
Olive	49,765	5,784	55,549
Orange	9,514	4,429	13,943
Peach	227,898	21,338	249,236
Pear	27,513	3,260	30,773
Plum	24,062	4,317	28,379
Prune	52,108	11,841	63,949
Quince	3,075	1,237	4,312
Total fruit	526,012	68,849	594,811
Almond	139,513	5,219	144,732
Chestnut	142	28	170
Pecan	198	173	371
Walnut	6,812	20,462	27,274
Total nut trees	146,665	25,882	172,547
Berries, acres	341	218	559

Grapevines, all kinds—Bearing, 16,318,250; non-bearing, 11,704,500; total, 18,022,750.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	6,750	$202,500
Stock	25,670	513,400
Dairy cows—Graded	14,530	581,200
Thoroughbred—		
Holsteins	40	4,000
Shorthorns	45	4,500
Calves	7,215	50,505
Swine	41,236	82,472
Horses—		
Thoroughbred	.....	1,560,000
Standard-bred	15,600	.....
Common	5,275	316,500
Colts	3,650	73,000
Jacks and jennies	.....	3,500
Mules	5,822	640,420
Sheep	48,935	146,805
Lambs	1,630	1,550
Common goats	100	200
Total stock all kinds	176,498	$4,180,552
Wool, pounds	165,400	$26,500

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	33,135	$198,810
Ducks	225	2,250
Geese	210	2,520
Turkeys	1,596	23,940
Eggs	3,014,806	753,701
Total value		$981,221

STATISTICS OF SAN JOAQUIN COUNTY, 1908-9—Continued.

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 2,450	.....	$4,900
Beeswax	2,500	125
Flowers and plants, acres	8	7,200
Honey	5,500	2,750
Total value		$14,975

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Art goods	3	14	$17,450
Bookbinderies and printers	6	142	272,800
Awnings	1	16	29,500
Bags and tents	1	135	203,600
Brick	4	203	280,000
Bakeries	7	65	190,000
Brooms	1	4	7,900
Buhach	1	7	31,200
Carriages and wagons	8	73	145,050
Boats	4	45	118,340
Cement	5	170	85,000
Boilers	1	4	5,600
Cigars	3	9	16,600
Gloves	1	58	71,500
Clothing	14	50	110,700
Dredges	1	85	242,000
Confectionery	4	28	57,890
Gas engines	5	185	304,285
Ice	1	8	42,000
Harness	4	28	56,000
Electrical supplies	2	24	32,100
Flouring mills	4	240	$4,830,800
Foundries and iron works	4	175	440,000
Fence wire	1	22	9,000
Furniture	5	24	61,250
Fancy leather goods	1	6	10,420
Jewelry	5	16	24,700
Ladders	1	5	7,500
Mineral waters	1	4	3,200
Farm machinery	9	395	1,843,000
Macaroni	3	15	49,350
Mealfalfa	1	6	26,000
Meat products	6	85	237,500
Olive oil	6	52	32,300
Patterns	1	2	4,600
Pickled olives	2	8	4,800
Paints and oils	3	12	47,500
Planing mills	8	261	607,700
Salt	1	14	22,000
Soap	1	8	43,000
Artificial stone	3	60	17,500
Granite and marble	2	7	23,000
Tanneries	1	78	462,000
Tin and galvanized iron	2	22	13,000
Wire screens	1	5	6,850
Windmills	1	15	42,500
Cooperage	2	11	8,300
Beverages	118	260	927,500
Canneries	3	1,240	391,500
Creameries	2	37	587,500
Totals	280	4,441	$13,103,785

SAN MATEO.

San Mateo County is a peninsula, at the head of which is situated the city and county of San Francisco. The Sierra Morena Mountains run lengthwise through the center of the county, leaving a rich valley on the east, towards the bay of San Francisco, and another valley on the west towards the Pacific Ocean.

The principal agricultural resources of San Mateo County are derived from the dairy products and vegetables furnished San Francisco. The beautiful Crystal Springs lakes, in the San Andreas Valley, are the main reservoirs of the Spring Valley Water Company, and furnish water to San Francisco.

The shore line of San Mateo County, along San Francisco Bay, is practically undeveloped. There is room for many factories there, and water transportation and railroad facilities are easily accessible from many bay shore points.

In the valleys of the Sierra Morena hills, many farms and dairies are situated. The north end of the county and portions of the ocean side are literally covered by vegetable gardens.

There are a few lumber mills in the mountains, but much of the timber there is still untouched.

San Mateo County is rapidly becoming San Francisco's principal suburb, and hundreds of new homes are being erected each year.

STATISTICS OF SAN MATEO COUNTY, 1908-9.

General Statistics.

Area, 477 square miles, or 305,280 acres.	
Number of farms	557
Number of acres assessed	298,000
Value of country real estate	$10,643,230
Of improvements thereon	$4,416,525
Of city and town lots	$6,613,265
Of improvements thereon	$2,399,560
Of personal property	$2,284,945
Total value of all property	$26,257,525
Expended on roads, last fiscal year	$99,044
Expended for bridges, last fiscal year	$26,093
Number of miles of public roads	760
Road levy per $100, 1909	50c
Value of county buildings	$123,000
Railroads, steam—miles, 54.12; assessed value	$805,404
Railroads, electric—miles, 14; assessed value	$151,800
Electric power plants—4; assessed value	$300,000
Electric power lines—miles, 70; assessed value	$40,000

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	2	.....	.....
Butter, pounds		457,000	$120,000
Cheese, pounds		652,000	97,400
Milk, gallons		1,500,000	300,000
Cream, gallons		10,000	6,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	32,065	6,000	38,065
Apricot	3,020	.....	3,020
Cherry	300	.....	300
Fig	100	.....	100
Olive	10,000	2,000	12,000
Orange	200	.....	200
Peach	845	.....	845
Pear	650	.....	650
Plum	150	.....	150
Prune	11,995	1,400	13,395
Other kinds	200	.....	200
Total fruit trees	59,525	9,400	68,925
Almond	500	.....	500
Walnut	800	.....	800
Total nut trees	1,300	.....	1,300
Grapevines	189,720	1,000	190,720
Berries, acres	200	.....	200

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	968	412	$14,035
Barley	1,120	719	20,132
Oats	16,020	8,116	260,712
Corn	40	20	640
Total cereals	18,148	9,267	$295,519
Grain hay	7,568	18,602	$241,826

STATISTICS OF SAN MATEO COUNTY, 1908-9—Continued.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,127	$33,810
Stock	3,200	80,000
Dairy cows—Graded	11,635	290,875
Thoroughbred—		
Jersey	340	13,600
Shorthorns	325	18,750
Calves	4,700	23,500
Swine	5,040	30,240
Horses—		
Thoroughbred	200	20,000
Common	2,237	111,850
Colts	269	5,380
Mules	50	3,000
Sheep	2,500	12,500
Lambs	400	800
Common goats	150	750
Total stock all kinds	32,173	$645,055
Wool, pounds	11,000	2,200

Fruits, Vegetables, Etc.

	Total Production.	
Green—	*Pounds.*	*Value.*
Apples	295,500	$56,450
Apricots	9,530	4,000
Blackberries	1,500	120
Beans, string	300,000	17,000
Beets	200,000	1,000
Cabbage	20,000,000	200,000
Celery	200,000	15,000
Cauliflower	6,000,000	60,000
Corn	75,000	1,500
Cherries	12,000	600
Grapes, wine (see wines)	956,000	.....
Onions	200,000	4,000
Pears	7,100	200
Peaches	3,600	150
Peas	250,000	12,500
Irish potatoes	3,500,000	35,000
Strawberries, chests	200	1,600
Tomatoes	100,000	1,000
Artichokes	880,000	5,280
Total value		$415,400
Dried—	*Pounds.*	*Value.*
Beans	700,000	$31,500
Onions	100,000	3,000
Prunes	200,000	5,000
Totals	1,000,000	$39,500

Miscellaneous Products.

	Pounds.	*Value.*
Flowers and plants, acres	400	$400,000
Onion seed	100,000	25,000

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	47,000	$9,400

Number of wineries, 7.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	6,500	$32,500
Ducks	150	675
Geese	50	600
Turkeys	80	1,120
Eggs	230,000	46,000
Total value		$80,895

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	25,000	$1,250,000
Redwood, acres	25,000	1,250,000
Sawmills	5	75,000
Fuel, wood, cords	2,650	15,900
Lumber, feet	15,000,000	300,000
Shingles, thousand	7,000	14,000
Total value		$1,654,900

Power used for mills and manufactories in county—Steam, 26; electrical, 14.

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Wood boxes	1	8	$5,000
Cigars	3	14	22,000
Confectionery	6	10	8,200
Foundry and iron works	1	130	1,404,000
Meat products	1	500	
Hides		....	246,000
Lard		....	459,000
Meat packed		....	260,000
Tallow		....	150,000
Olive oil		....	350
Planing mills	11	100	2,750,000
Pottery	1	146	1,568,000
Salt	3	67	172,000
Tanneries	2	300	1,568,000
Fuse works	1	50	200,000
Paint works	1	200	.....

Manufactured Output.

	Quantity.
Brick, thousand	2,200
Cigars, thousand	58
Hides, pounds	904,000
Lard, pounds	6,600,000
Meat packed, pounds	4,000,000
Tallow, barrels	8,000
Olive oil, gallons	150
Salt, tons	3,500

SANTA BARBARA COUNTY.

Santa Barbara County is situated in the great parallelogram formed by the bend in the California coast line at Point Concepcion. It has several good harbors, but only two of these, Santa Barbara and Alcatraz, are used by seagoing vessels. There are no navigable rivers. Most of the territory is mountainous, but there are a number of large and fertile valleys. The climate is excellent, especially at Santa Barbara, the county seat. The population of the county is approximately 28,000, of which the city of Santa Barbara has about 13,000. The latter is a very popular winter and summer resort. It has many fine homes, and several large business blocks. A Federal building to be used as a post office and as headquarters for the Santa Barbara National Forest is soon to be erected. Much street and road improvement is under way throughout the county. Fruits, grains, beans and walnuts are the principal agricultural products. There is a sugar factory near Santa Maria, in the northern end of the county, where 85,000 tons of beets are annually grown, and produce 15,000 tons of sugar. The Santa Maria and Summerland oil fields are among the best known in the State. The county has many large ranches which should be subdivided and which would easily furnish homes for a large population. A movement is on foot to effect this subdivision.

The past year has seen great crops in this county, and every kind of enterprise has prospered to an extent exceeding all previous records.

STATISTICS OF SANTA BARBARA COUNTY, 1908-9.

General Statistics.

Area, 2,630 square miles, or 1,810,665 acres.	
Number of farms, estimated..	1,275
Number of acres assessed.....	1,056,285
Value of country real estate...	$11,225,175
Of improvements thereon.....	$1,751,687
Of city and town lots.....	$5,018,315
Of improvements thereon.....	$5,023,606
Of personal property.....	$5,948,205
Money and solvent credits.....	$170,455
Total value of all property....	$29,137,443
Expended on roads, last fiscal year	$188,126
Expended for bridges, last fiscal year	$92,500
Number of miles of public roads	1,000
Road levy per $100, 1909.....	35c
Value of county buildings.....	$200,000
Railroads, steam — miles, 155.07; electric—miles, 23; assessed value	$2,970,915
Electric power plants—4; assessed value	$54,400
Number of acres irrigated, about	3,000

Wines, Brandies, Etc.

	Gallons.	*Value.*
Sweet wines	20,000	$7,000
Number of wineries, 1.		

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat, about ..	1,000	625	$21,875
Barley	35,000	24,700	617,500
Oats	6,000	4,950	148,500
Corn	1,000	500	5,000
Total cereals.		30,775	$792,875
Grain hay	30,000	43,000	$45,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	20,670	1,800	22,470
Apricot	2,520	1,410	3,930
Cherry	650	.....	650
Lemon 105,000		32,600	137,600
Olive	25,120	8,500	33,620
Orange	715	350	1,065
Peach	300	335	635
Pear	1,200	310	1,510
Prune	1,270	170	1,440
Other kinds	500	500	1,000
Total fruit 157,945		45,975	203,920
Walnut	30,670	21,710	52,380
Other nuts	100	100	200
Total nut trees..	30,770	21,810	52,580

STATISTICS OF SANTA BARBARA COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	1,600,000	$16,000
Asparagus	40,000	2,800
Blackberries	75,000	2,500
Beets	30,000,000	1,500,000
Cherries	42,000	2,520
Figs	25,000	1,250
Grapes	10,000	1,000
Grape fruit, boxes	500	500
Lemons, boxes	105,000	200,000
Loganberries	100,000	3,000
Nectarines	20,000	400
Oranges, boxes	850	1,600
Olives, tons	600	30,000
Pears	400,000	8,000
Peaches	100,000	2,000
Peas	200,000	8,000
Persimmons	300,000	12,000
Irish potatoes	11,550,000	115,500
Sweet potatoes	40,000	1,000
Prunes	10,000	150
Raspberries	12,000	720
Strawberries	160,000	6,000
Rhubarb	2,000	500
Miscellaneous	100,000	5,700
Total value		$1,921,140
Dried—	*Pounds.*	*Value.*
Apricots	80,000	$5,800
Beans	31,050,000	1,086,750
Onions	5,750,000	37,375
Walnuts	2,600,000	325,000
Totals	39,480,000	$1,454,925

Fish Industry.

	Pounds.	*Value.*
Miscellaneous	1,000,000	$80,000

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	2	.....	.....
Receiving stations	2	.....	$109,000
Butter, pounds		325,000	97,500
Butter, lbs., small producers		100,000	30,000

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	6,000	$20,000
Ducks	100	500
Geese	25	150
Turkeys	50	600
Eggs	320,000	112,000
Total value		$133,250

Forest Products.

	Amount.	*Value.*
Area of timber lands, pine, acres	25,000	.....
Lumber, feet*	75,000,000	$600,000

Power used for mills and manufactories in county—Steam, 40; electrical, 50.

*Lumber is all in United States forest and inaccessible.

Live Stock Industry.

	Number.	*Value.*
Cattle—Stock	26,675	$600,000
Dairy cows—Graded	7,864	200,000
Thoroughbred—		
Ayrshire	60	4,500
Holsteins	15	1,000
Jersey*	300	10,000
Calves	2,815	25,000
Swine	7,420	100,000
Horses—		
Standard-bred	38	7,000
Common	4,010	200,000
American	2,420	200,000
Colts	850	30,000
Jacks and jennies	12	1,200
Mules	1,630	125,000
Sheep	60,510	200,000
Total value		$1,703,700
Wool, pounds	110,000	$14,300

*Not all registered.

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 2,000	.....	$20,090
Flowers and plants, acres	100	50,000
Honey	600,000	30,000
Sugar beets, tons	85,000	1,500,000
Mustard	3,250,000	130,000
Diatomaceous earth	.....	5,000
Sweet peas	100,000	7,000
Crude oil, barrels	9,000,000	8,000,000

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Bookbindery	1	3	$3,500
Paper boxes	2	4	1,000
Brick	2	15	4,000
Cigars	3	6	8,000
Confectionery	5	14	60,000
Foundries and iron works	2	10	3,000
Jewelry	1	3	2,500
Lime*	1	50	50,000
Machinery (parts)	3	10	20,000
Meat products	10	60	
Hides		....	18,000
Lard		....	25,000
Meat packed		....	5,000
Tallow		....	7,500
Olive oil	5	40	40,000
Iron pipe	1	3	1,200
Planing mills	3	36	135,000
Artificial stone	1	5	6,000
Sugar, beet	1	900	1,500,000
Miscellaneous	5	30	50,000
Diatomaceous earth	1	10	5,000

*Made for sugar factory by its own employees; has only a potential value.

Manufactured Output.

	Quantity.
Brick, thousand	500
Cigars, thousand	100
Lime, barrels	45,000
Hides, pounds	200,000
Lard, pounds	200,000
Meat packed, pounds	50,000
Tallow, barrels	750
Olive oil, gallons	40,000

SANTA CLARA COUNTY.

Santa Clara County is situated on the south arm of San Francisco Bay and is separated from the Pacific Ocean by one tier of counties. The county seat is San Jose, and is distant 50 miles from San Francisco. The county is 47 miles wide from north to south and through the center runs the favored Santa Clara Valley with an average width of 15 miles. The county from the valley slopes upward through rolling hills to the summit of the Mount Diablo Range of mountains on the east and to the summit of the Santa Cruz Mountains on the west. Its peculiar location with reference to prevailing winds and ocean currents has a marked effect upon the climate, rendering it pleasantly cool in summer and not too cold in winter. The average winter temperature is about 40 degrees and in summer 70 degrees. It is preëminently the horticultural county of California. The statistics accompanying this report show the variety and quantity of its products.

Its roads are excellent and make all points easily accessible. More than 300 miles of these roads are sprinkled during the summer months. Three lines of railroads connect it with the outside world. Its population is 70,000. San Jose, the county seat, has a population of 30,000. Many flourishing towns and villages are within its borders.

Educational interests are represented by the Leland Stanford Junior University, the Santa Clara College, the University of the Pacific, The College of Notre Dame, and the State Normal School, together with numerous private seminaries and institutions for special educational work. In the public school system there are 8 high schools and 104 grammar and primary schools. The annual expenditure for public schools is $311,500. This is in addition to the municipal expenditures by cities and towns for this purpose. The value of school property is $910,832.

The valley is drained by a number of streams. In the summer their water courses greatly diminish and the smaller ones wholly disappear. Having their sources in the surrounding hills and sinking as they approach the valley, they augment the subterranean supply of the artesian wells. These are all over the valley, usually from 60 to 100 feet in depth, though some find a larger and more permanent supply at a much greater depth.

The extent and value of agricultural, horticultural, and industrial interests can be gathered from the accompanying statistics.

STATISTICS OF SANTA CLARA COUNTY, 1908-9.

General Statistics.	
Area, 1,355 square miles, or 867,200 acres.	
Number of farms	23,630
Number of acres assessed	727,906
Value of country real estate	$23,320,010
Of improvements thereon	$8,026,705
Of city and town lots	$15,115,690
Of improvements thereon.	$10,830,930
Of personal property	$6,141,155
Total value of all property	$72,592,453
Expended on roads, last fiscal year	$242,111
Expended for bridges, last fiscal year	$9,701

General Statistics—Continued.	
Number of miles of public roads	988
Road levy per $100, 1909	40c
Value of county buildings	$946,000
Irrigating ditches, cost	$15,000
Railroads, steam, assessed value	$2,679,299
Railroads, electric, assessed value	$528,010
Electric power plants, assessed value	$126,490
Electric power lines, assessed value	$175,705

STATISTICS OF SANTA CLARA COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

	Total Production.	
Green—	*Pounds.*	*Value.*
Apples	378,000	$67,500
Apricots	60,000,000	900,000
Asparagus	8,000,000	200,000
Blackberries	937,000	43,000
Beans	1,000,000	30,000
Beets	260,000	2,600
Cabbage	350,000	3,500
Celery	156,250	4,680
Cauliflower	130,000	4,000
Corn	1,450,000	30,000
Cherries	7,500,000	225,000
Figs	75,000	2,500
Grapes	2,640,000	26,400
Lemons, boxes	1,350	1,350
Loganberries	275,000	5,500
Onions	110,000	3,300
Oranges, boxes	1,500	1,500
Olives	550,000	16,000
Pears	10,000,000	225,000
Peaches	40,000,000	250,000
Peas	2,450,000	45,000
Plums	337,000	15,200
Irish potatoes	1,140,000	22,800
Prunes	150,000,000	1,500,000
Quinces	192,000	9,000
Raspberries	625,000	36,000
Strawberries	1,180,000	45,000
Tomatoes	30,000,000	180,000
Total value		$3,894,830
Dried—	*Pounds.*	*Value.*
Almonds	300,000	$33,000
Apricots	8,000,000	680,000
Beans	352,000	12,000
Onions	912,000	27,360
Peaches	6,000,000	225,000
Plums	400,000	5,000
Prunes	75,000,000	2,250,000
Walnuts	360,000	36,000
Totals	91,324,000	$3,268,360
Canned—	*Cases.*	*Value.*
Apples	7,500	$26,000
Apricots	80,000	204,000
Grapes	15,000	50,000
Pears	50,000	170,000
Peaches	60,000	480,000
Peas	78,000	200,000
Plums	10,000	24,500
Tomatoes	175,000	275,000
Totals	475,500	$1,429,500

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,250	$50,000
Stock	10,320	218,000
Dairy cows—Graded	6,580	263,200
Thoroughbred—		
Angus	420	33,600
Calves	4,910	52,370
Swine	5,120	27,300
Horses—		
Thoroughbred	86	24,080
Standard-bred	240	48,000
Common	12,740	653,700
Colts	1,850	50,000
Jacks and jennies	44	590
Mules	245	16,330
Sheep	925	3,600
Lambs	435	1,700
Angora goats	140	950
Common goats	320	430
Total stock all kinds..	45,625	$1,443,850

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	400	350	$14,000
Barley	1,500	1,100	30,000
Oats	400	225	12,375
Total cereals.	2,300	1,675	$56,375
Alfalfa hay	500	2,000	$24,000
Grain hay	10,000	20,000	300,000
Total hay	10,500	22,000	$324,000

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	1,340,000	$278,000
Sweet wines	23,000	23,000
*Champagne, bottles.	439,500	439,500
Beer, barrels	90,000	720,000
Brandy	470,000	705,000
Alcohol	2,000,000	2,400,000
Total value		$4,565,500

Number of wineries, 49; distilleries, 11; breweries, 6.

*The bottle is the unit of measurement for champagne.

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	17,010	33,400	50,410
Apricot	543,000	10,100	553,100
Cherry	137,000	22,500	159,500
Fig	1,485	620	2,105
Lemon	455	505	960
Nectarine	947	485	1,432
Olive	10,320	4,800	15,120
Orange	1,170	760	1,930
Peach	592,000	39,700	631,700
Pear	126,000	15,100	141,100
Plum	274,000	19,800	293,800
Prune	5,170,000	379,280	5,549,280
Quince	2,400	340	2,740
Other kinds	57,500	369,000	426,500
Total fruit.	6,933,287	896,390	7,829,677
Almond	17,700	4,800	22,500
Walnut	10,750	3,000	13,750
Total nut	28,450	7,800	36,250

Grapevines, all kinds, 8,260 acres.

Dairy Industry.

	Production.	*Value.*
Creameries	280,000	$280,000
Butter, pounds	267,540	80,262
Cheese, pounds	445,500	81,100
Total value		$441,362

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	60,000	.....
Oak, acres	50,000	$500,000
Redwood, acres	10,000	30,000
Fuel, wood, cords	40,000	32,000
Sash and door factories, number	6	96,000
Total value		$658,000

Power used for mills and manufactories in county—Steam, 212; electrical, 111; water, 2.

STATISTICS OF SANTA CLARA COUNTY, 1908-9—Continued.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	30,000	$100,000
Ducks	3,500	14,000
Geese	300	4,500
Turkeys	350	7,000
Eggs	456,500	114,125
Total value		$239,625

Miscellaneous Products.

	Pounds.	*Value.*
Flowers and plants, acres	150	$100,000
Garden seed	3,500,000	1,500,000
Sugar beets, tons	10,000	100,000
Quicksilver, flasks	2,000	82,900
Total value		$1,782,900

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Bookbinderies	2	68	$101,500
Wood boxes	3	37	80,000
Brick	5	186	114,000
Brooms	1	2	2,300
Carriages and wagons	11	110	108,375
Cigars	10	51	58,720
Coffee, spices, etc.	2	26	123,000
Confectionery	23	62	138,000

Manufactories—Continued.

	No.	*No. of Empl's.*	*Value of Product.*
Foundries and iron works	13	105	$281,070
Furniture	6	18	23,000
Jewelry	2	5	7,500
Leather goods	18	42	103,000
Meat slaughtered		....	146,000
Hides		....	90,000
Lard		....	3,030
Tallow		....	1,550
Olive oil		....	55,500
Pickled olives		....	25,000
Planing mills	14	750	260,000
Potteries	2	23	40,000
Soap	1	4	3,200
Artificial stone	5	30	150,000
Granite	6	60	19,500
Tanneries	2	133	40,000
Tin and galvanized iron	6	73	147,600
Willow and wooden ware	1	1	1,800
Wood turning and carving	1	1	1,600
Miscellaneous	85	936	3,889,800
Total value			$6,550,515

Manufactured Output.

	Quantity.
Olive oil, gallons	18,500
Pickled olives, gallons	43,750

SANTA CRUZ COUNTY.

Santa Cruz County fronts its entire length on the Pacific Ocean. It lies midway between Oregon and Lower California, and is in the heart of Central California. It is separated from San Mateo and Santa Clara counties by the Santa Cruz Mountains, and from Monterey County by the Pajaro River. It is one of the smallest counties, and comprises a narrow strip of mountainous land about 40 miles long and 18 broad, forming a vast amphitheater, and sloping from the summits of the Santa Cruz range, whose highest elevation, Loma Prieta, is 4,000 feet, southward and westward to the bay of Monterey.

The curving line of shore and the corresponding curve of the mountain line inclose an irregular, crescent-shaped tract of country, with an average width of 20 miles, which for grandeur, beauty, and variety of scenery equals any expanse of similar size in the world. The sides of the mountains are closely set with forests of pine, redwood, madrone, and other trees, the redwoods having, in many cases, attained gigantic growth.

A number of streams rise in these hills, and bring down the rich alluvial loam into the valleys, which, in their normal condition, teem with native grasses and flowers, and when cultivated yield phenomenal results.

These streams are, agriculturally as well as topographically, an important feature, watering as they do every section of land. Besides these, natural springs are innumerable. Nearing the coast, there are many interesting topographical features. The leagues of wide, high, wind-swept grassy plateaus, which form remarkable grazing and dairy lands; the succession of chalk terraces; the broad amphitheatrical valley of the Pajaro; the salt lagunas, picturesque in configuration and surrounded by park-like groves of live oaks; the high sandstone cliffs along the shore; the magnificent ocean drives—all are materials for pleasant investigation.

Along the coast line, a series of raised benches forms a strip of elevated land. This widens to the south of the city of Santa Cruz, and affords a large area of fruitful soil, which has been brought into a high state of cultivation. From Santa Cruz City south the soil consists of light loam, abounding in lime, potash, and phosphoric acid.

In the Pajaro Valley there is a great variety from the rich sedimentary alluvial wash to the light, sandy soil of the foothills.

In the lower part of the valley a clayey loam predominates. This is followed by a heavy adobe higher up, and then the dark, reddish loam of the plains, the latter being the favorite with fruit growers, for it is here that flourish the best orchards.

The average annual rainfall, taken from a record of thirty-four consecutive years, is 25.26 inches, showing that this is a well watered district.

The charm of Santa Cruz is her infinite variety. In lumber products she ranks third in the State. Her butter, cheese and cream might well

win her a place in the dairy districts. Hay, grain, potatoes, and the whole range of cereals and vegetables give enormous yields. In the Department of Agriculture at Washington, D. C., there is a record of 130 bushels of wheat per acre raised in the Pajaro Valley, and while she does not claim to wear the "citrus belt," yet oranges are raised for home consumption and the cultivation of the lemon is a profitable business; but her deciduous fruits, large and small, her table and wine grapes, and her fine wines, are winning renown. From the summit of the range, more than 2,000 feet above the sea, down to the wide and fruitful valleys along the coast, grow and flourish delicious fruits. Prunes, pears, apricots, peaches, cherries, Japanese and native plums, figs, walnuts, persimmons, olives and nectarines thrive, but the crop of the largest profit is that of apples, their quality and size being astonishing and their yield as much so. From bellflowers in September to Newtown pippins in December the supply is steady. The market for apples extends to England and the continent, Germany being a large buyer. The especial home of the apple, as well as that of the strawberry, is the fertile valley of the Pajaro River, and the flavor and color of the foothill apples are renowned. The exhibition of apples at the Pajaro Valley Fair, during October, 1907, was, according to the best authorities on the subject, never equaled in California either in quality or quantity. This exhibit contained over two car loads of apples, representing over fifty varieties, but the standards of the valley, Bellflowers, Newtowns, Langford's Seedlings, Pearmains and Missouri Pippins, predominated. The general excellence of the pack, which was largely commercial (few of the apples having been packed in a fancy manner for exhibition purposes), gained the admiration of experienced apple men. The saying, "Our farmers are our capitalists," is no idle boast in the Pajaro Valley, and one is soon convinced of this fact if a ride is taken over its well-kept roads through miles of orchards and cultivated farms. Watsonville, the trading center of this fertile valley, is the third station in the matter of shipments on the coast division of the Southern Pacific Railroad, and the volume of business is increasing every year. There is now a movement under way to afford this section water transportation through the Pajaro River to Monterey Bay, which will place the producers of this vicinity on an equal footing with any other section of the State.

Last year there were used in the canneries, driers, and vinegar plant 9,103 tons of apples, the output of the same was 16,900 cases of canned apples, 54 cars of evaporated apples, and 315,000 gallons of vinegar. These industries, together with 37 packing houses, furnished employment for over 1,100 persons.

Of the small fruits, the strawberry is the most widely grown and furnishes a practically continuous crop.

In the southern part of the county a large acreage is devoted to the profitable growth of sugar beets, potatoes, beans and onions, and the yield is enormous. Market gardening is profitable.

A great deal of asparagus and rhubarb are grown for outside markets.

Seeds, bulbs, plants, and cut flowers contribute largely to the supply for metropolitan markets.

Dairying is a profitable industry, and thousands of acres of grazing land support well-selected herds of stock.

Poultry raising is a profitable business, the climate and conditions being well adapted for such industry.

Considerable capital is invested in the deep sea fisheries. The fish hatchery at Brookdale, on Clear Lake, has upward of 2,000,000 trout and salmon fry.

During the fall and winter months 5,000,000 or 6,000,000 salmon eggs will be hatched and the fry liberated in the bay. Steelhead and rainbow trout abound in all the thirty odd streams.

The forest covered mountains are a retreat for quail and deer, and the many lagoons and the four beautiful lakes in the Pajaro Valley in fall and winter are feeding places for all varieties of wild ducks.

At Santa Cruz the tent city, pavilion, casino and baths, representing an expenditure of $750,000, were opened two years ago, and this beautiful summer resort had practically the greatest concourse of pleasure seekers on the coast. It is estimated 100,000 people from San Francisco and interior visited our shores during the summer.

Capitola, four miles east of Santa Cruz, can be reached by both steam and electric railroad. This is another beautiful summer resort.

There are two Carnegie libraries in the county well stocked with the latest works.

The public schools throughout the county are of a high standard, as are also the private schools and colleges. The many fine churches represent the leading denominations.

There are many fraternal societies, and a large number of them hold meetings in fine lodge rooms in buildings of their own.

There are five banks in the county—all sound banking institutions.

The supervisors have done and are doing good work in road building, and the most mountainous places can now be reached by easy grades.

Many industries have developed to the profit producing point. The Santa Cruz Portland cement plant, located 12 miles north of the city of Santa Cruz, represents an expenditure of $5,000,000, and has the largest capacity for the manufacture of cement of any similar institution of its kind. The powder works, tannery, paper mill, soap and glue factory, planing and sawmills, lime kilns and the bitumen industry, are all in active operation, and the general air of thrift and prosperity is apparent. The output of lumber has been large for a great many years, but great tracts of forest still remain. Many of the trees are of ancient growth, and it is not uncommon to see 35,000 feet of clear lumber cut from a single tree.

Santa Cruz, Watsonville, Boulder Creek, Soquel, Aptos, Ben Lomond, Brookdale, Felton, Capitola, Davenport, and Glenwood are the principal towns.

STATISTICS OF SANTA CRUZ COUNTY, 1908-9.

General Statistics.		General Statistics—Continued.	
Area, 500 square miles, or 320,000 acres.		Expended for bridges, last fiscal year	$6,251
Number of farms	1,775	Road levy per $100, 1909	60c
Number of acres assessed	262,938	Value of county buildings	$217,500
Value of country real estate	$5,445,136	Railroads, steam—miles, 51.49; assessed value	$903,975
Of improvements thereon	$1,916,922	Railroads, electric—miles, 15; assessed value	$82,796
Of city and town lots	$5,914,142	Electric power plants, 3; electric power lines—miles, 70; assessed value	$110,401
Of improvements thereon	$3,317,868	Number of acres irrigated	1,200
Of personal property	$2,240,978		
Total value of all property	$18,835,038		
Expended on roads, last fiscal year	$50,942		
Number of miles of public roads	458		

STATISTICS OF SANTA CRUZ COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	138	104	$4,160
Barley	200	250	6,250
Oats	889	623	31,150
Corn	590	1,170	24,900
Total cereals.	1,817	2,147	$76,460
Alfalfa hay	125	622	$5,125
Grain hay	8,476	11,457	147,162
Total hay	8,601	12,079	$152,287

Fruits, Vegetables, Etc.

	Total Production. Pounds.	Value.
Green—		
Apples	102,648,570	$1,498,700
Apricots	6,699,000	167,400
Asparagus	3,250	405
Blackberries	631,500	31,575
Cucumbers, hothouse	17,000	1,360
Currants	30,000	2,000
Cherries	402,000	24,720
Figs	18,000	920
Grapes, table	2,640,000	52,800
Grapes, wine	2,980,000	14,900
Loganberries	252,000	9,450
Pears	1,542,800	17,000
Peaches	2,168,850	37,955
Plums	830,000	12,700
Irish potatoes	8,000,000	100,000
Quinces	8,250	205
Raspberries	120,000	7,100
Strawberries	2,460,000	138,375
Tomatoes	115,000	1,150
Totals	131,563,002	$2,018,755
Dried—	*Pounds.*	*Value.*
Almonds	2,120	$198
Apples	3,494,000	209,640
Apricots	640,000	44,800
Beans	150,000	52,000
Onions	2,800,000	22,000
Peaches	8,000	480
Prunes	1,000,000	28,000
Walnuts	32,900	4,200
Totals	8,127,020	$361,318
Canned—	*Cases.*	*Value.*
Apples	15,000	$45,000

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	204,000	$39,295
Sweet wines	20,000	6,500
Beer	120,000	26,000
Beer, barrels	14,000	112,000
Cider	105,000	44,000
Vinegar	670,000	118,000

Number of wineries, 10; breweries, 2.

Fish Industry.

	Pounds.	Value.
All kinds	1,419,133	$46,000

About 30 men are employed in the fishing industry between Santa Cruz and Capitola.

Dairy Industry.

	Production.	Value.
Butter, pounds	370,122	$103,386
Cheese, pounds	449,270	44,927
Cream, gallons	11,195	12,315

Number of creameries, 2; dairies, 20.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	830,357	86,930	917,287
Apricot	111,650	23,969	135,619
Cherry	23,744	3,056	26,800
Fig	230	76	306
Lemon	193	56	249
Nectarine	.....	12	12
Olive	540	1,142	1,682
Orange	145	75	220
Peach	11,060	3,052	14,112
Pear	16,401	3,953	20,354
Plum	13,000	800	13,800
Prune	78,200	3,202	81,402
Quince	165	10	175
Other kinds	1,400	.....	1,400
Total fruit	1,087,085	126,333	1,213,418
Almond	212	6	218
Chestnut	28	.....	28
Pecan	.....	4	4
Walnut	4,398	102	4,500
Total nut	4,638	112	4,750
Berries, acres	625	.....	625
Table grapes, acres	725	250	975
Wine grapes, acres	1,020	600	1,620

Live Stock Industry.

	Number.	Value.
Cattle—Beef	2,000	$63,000
Stock	1,400	28,000
Dairy cows—Graded	4,979	131,540
Thoroughbred—Angus	4	400
Herefords	3	300
Jersey	20	1,000
Shorthorns	1	100
Calves	2,438	20,224
Swine	1,822	19,650
Horses—Thoroughbred	14	5,600
Standard-bred	86	17,200
Common	3,340	167,000
Colts	560	29,500
Mules	89	7,600
Sheep	1,741	6,250
Lambs	750	1,500
Angora and common goats	700	3,150
Total stock all kinds.	19,947	$502,014
Wool, pounds	3,000	$600

Forest Products.

	Amount.	Value.
Area of timber lands, redwood, acres	7,715	$248,450
Sawmills, number	7	49,000
Charcoal, sacks	1,570	785
Fuel, wood, cords	51,000	255,000
Laths, thousand	2,400,000	88,667
Lumber, feet	71,622,000	1,258,220
Pickets, pieces	2,005,037	83,167
Piles	5,000	9,000
Posts, pieces	725,250	90,053
Railroad ties (pieces)	37,746	16,100
Shakes, thousand	919,000	14,704
Shingles, thousand	26,402	59,404
Stave bolts, cords	1,000	7,500
Tanbark, cords	1,126	16,890
Grape stakes	968,000	21,780
Total value		$2,218,720

Power used for mills and manufactories in county—steam, 22; water, 1; electrical 6; gasoline, 10.

STATISTICS OF SANTA CRUZ COUNTY, 1908-9—Continued.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	5,754	$32,052
Ducks	145	725
Geese	125	1,185
Turkeys	185	3,800
Eggs	670,590	174,353
Total value		$212,115

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 360	.....	$790
Flowers and plants, 15 acres	.....	15,000
Honey	3,600	450
Hops	60,000	15,000
Sugar beets, tons, 4,850.	.....	24,250

Manufactured Output.

	Quantity.
Cement, tons	169,000
Cigars	397,000
Lime, barrels	305,762
Hides (leather), pounds	1,200,000
Lard, pounds	43,850
Meat packed, pounds	89,150
Tallow, barrels	460
Paper, pounds	2,000,000
Soap, pounds	126,000

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Wood boxes	3	15	$12,035
Berry chests, baskets and drawers	1	4	9,435
Carriages and wagons	4	10	16,780
Cement	1	700	1,777,400
Cigars	2	10	15,520
Confectionery	7	24	46,375
Cooper shops	2	12	15,260
Foundries and iron works	1	6	12,250
Leather goods, harnesses, etc.	7	10	30,500
Lime	4	220	408,565
Malt	1	.....	825
Meat products—	12	60	
Hides	..	.....	22,750
Lard	..	.....	4,385
Meat packed	..	.....	10,895
Tallow	..	.....	7,000
Paper	1	15	57,600
Powder works	1	125	500,000
Glue factory	1	2	2,600
Ice plant	1	10	20,000
Planing mills	8	121	413,000
Soda works	3	6	10,000
Soap	3	6	7,285
Bituminous rock, tons mined, 29,050	..	.....	87,150
Tanneries	1	40	360,000
Driers	7	110	.....

SHASTA COUNTY.

Shasta County lies at the head of the famous Sacramento Valley. One mile north of Redding, the county seat, the valley ends and the canyon, second only in fame to the valley, which bears the name of the greatest waterway in the State, begins. The area of the county covers 90 miles from east to west, and 60 miles from north to south. Because of its unlimited mining, timber and water resources and the prolific nature of its soils, Shasta County offers unequaled opportunities for the man of small means as well as the capitalist.

Covering a portion of eastern Shasta are the Sierra Nevada Mountains and on the northwestern boundary is the Coast Range. These are lofty, some peaks exceeding 5,000 feet in height, and are very rugged. On the extreme eastern border of the county is Lassen Peak, raising his mighty head 10,577 feet above sea level. This mountain is timbered two thirds of the way up. Hot and boiling springs, and others noted for their medicinal qualities, abound in this region. In the central and southern portions of the county is a semi-circular region, embracing over half a million acres of the grand Sacramento Valley proper, the altitude being from 500 feet to 2,500 feet above the sea. The southwestern portion of this section is a succession of rounded hills, varying in height from 50 to 200 feet, while the central and southern portions consist of table-lands, varying in altitude from 500 to 700 feet. Fertile valleys predominate.

Shasta is noted for the number and beauty of its streams. First in importance is the Sacramento River, which enters the county on its northern boundary, traversing it throughout to its southern border. For 40 miles the magnificent stream meanders through fertile lands, after emerging from the picturesque and rocky canyon. The Sacramento is augmented by the combined McCloud, Pitt, and Fall rivers, the former finding its source at Mount Shasta, on the extreme north, enters and travels in a southerly direction, emptying into the Pitt, which earlier has received the Fall River flow, and continuing, still in a southerly course, meets and enters the Sacramento at a point a few miles north from Kennett. The most beautiful of all northern streams is Fall River, meandering for 40 miles through verdant pasture and delightful glades. Besides these main streams, there are numerous tributaries of importance entering the Sacramento on both sides, among them being Battle Creek, the seat of the largest power propositions in the northern counties, Clear Creek and Cottonwood Creek.

The soil of the valleys is an alluvium, a rich sedimentary deposit, largely intermixed with disintegrated rock, and in some parts with a gravel. The usual color is light red or reddish brown. It is very fertile and excellent for plums, prunes, pears, figs, and small fruits. The mesa lands bordering the valleys are of a sandy loam, with a large percentage of clay, and carrying in many districts, especially in the higher parts, considerable gravel and bowlders. Fruit does finely on these mesa lands. On the foothills is a red loam or clay, productive

and adapted to berries. The soil varies on the elevated plateaus of the north and northwest from a black, sandy loam to a red loam or clay, while to the southwest the soil is generally adobe, productive of grain and rich natural grasses.

Irrigation is unnecessary for most crops, as the rainfall is sufficient. The rainy season begins in September and extends, at intervals of two or three weeks, from that time until May. During this time the ground is thoroughly saturated with moisture, and the rainy period covers the entire growing season. At the end of the wet season grains, grasses, etc., are ready for the harvest, and fruits, grapes, etc., are beginning to ripen.

Beautiful resorts and health-giving springs abound. The mountains are heavily timbered with sugar pine, cedar, fir, and other valuable timbers. There are some large valleys and extensive plateaus, mostly devoted to general farming, stock raising, and wool growing. The foothills are more or less timbered with oak and pine, and their higher portions yield all kinds of minerals and stone—gold, silver, copper, iron, quicksilver, platinum, lead, marble, sandstone, limestone, coal, onyx, etc.—affording also opportunities for lovely homes to the small farmer, fruit grower, stock raiser, poultryman, and gardener. The climate is pleasant, not extremely hot in summer nor cold in winter. The valleys are capable of producing all things that grow in temperate or semi-tropical regions.

Shasta orchards are a success, and produce heavy crops of the best quality. The prune, peach, pear, plum, apple, apricot, almond, fig, lemon, orange, and olive thrive, while grapes of the wine, table, and raisin varieties have proven a success in the valley districts. Wheat, grasses and alfalfa crop are prolific. There are good markets for everything produced, and home consumption is not nearly supplied, except in fruits. Grain, hay, butter, eggs, and vegetables are shipped into Shasta trade centers by the hundred car load during the year. Homeseekers will find land adapted to fruit raising, grain growing, poultry farming, and gardening at lower prices than in the older settled portions of the State.

Stock raising is an important trade factor. Mild winters in the lower altitudes obviate the necessity of feeding, while the summer ranges in the mountains make it possible for the stock raiser to keep his herds upon green feed the greater portion of the year.

The sawmilling industry annually distributes hundreds of thousands of dollars for pay rolls and supplies. The Terry Lumber Company, which operates its mills in the Bella Vista region, makes its central shipping point on the main line at Anderson, its planing mills, yards, and dry houses being connected to the latter town by its own railroad. T. H. Henton also has immense timber reserves at Wengler, in the big bend of the Pitt, from where he ships six million feet of logs annually to his mills and yards at Redding, using the Sacramento as an economical carrier. There are other large mills in the Shingletown country, where traction engines do the freighting.

At Fall River and Cottonwood there are flour mills and creameries, and a large area of land in Anderson and Balls Ferry is being prepared for a large number of families who are immigrating from Montana for the purpose of farming ten and twenty-acre tracts.

Throughout the Sacramento canyon are dotted numerous resorts, to which come tourists of all climes. They are easy of access, being for the most part on the main line of the Southern Pacific.

Redding, the county seat, is one of the most beautifully located cities on the Pacific Slope, commanding a superb view of both the Sierra and Coast ranges, and an equally peerless view of the Sacramento River, valley, and canyon—east, south, and north.

Anderson, 12 miles south of Redding, the fruit and lumber center of the county, and Kennett, 17 miles to the north of the county seat, are the two next most important centers, but Coram, where the largest copper smelter in the State is located, and Delamar, a big copper plant, are almost equally important.

Shasta's preëminence in mineral production, giving her the title of "banner county," is largely due to her immense copper output, but in other metals, especially gold and iron, her past records are quickly being beaten. With the necessity for silicious ores for a flux in the production of copper, immense activity is being shown in the gold territory to the west of Redding, and much capital is being interested in this direction.

Statistics showing the productions of the county are included herein, the figures being compiled from reports of the last preceding twelve months.

Copper production in the county has shown enormous strides since 1896, the year of the installation of the pioneer copper smelter in the county. In 1908, with only two smelters running, fairly full-handed, the output of the red metal was thirty million pounds; in 1909 it will be increased twenty-five per cent, and by the year 1911, with the five plants in operation, an output will be attained of 100,000,000 pounds. The gold output for 1908 exceeded $2,000,000.

In agriculture and horticulture Shasta County has great possibilities for extension, and large landholders are making experiments and tests with a view to obtaining the best return on their investment.

Irrigation is receiving active attention, as the most valuable lands lie within easy access to the numerous streams and watercourses that line the fertile valleys.

STATISTICS OF SHASTA COUNTY, 1908-9.

General Statistics.

Area, 4,050 square miles, or 2,590,000 acres.	
Number of farms	1,000
Number of acres assessed	1,515,450
Value of country real estate	$7,477,370
Of improvements thereon	$2,399,755
Of city and town lots	$680,970
Of improvements thereon	$1,248,075
Of personal property	$1,345,995
Total value of all property	$13,200,599
Expended on roads, last fiscal year	$51,581
Expended for bridges, last fiscal year	$16,901
Number of miles of public roads	1,015
Road levy per $100, 1909	40c
Value of county buildings	$167,000
Irrigating ditches—miles, 190; cost	$16,340
Railroads, steam—miles, 133; assessed value	$2,931,472
Railroads, electric—miles, 6; assessed value	$15,000

General Statistics—Continued.

Electric power plants—4; assessed value	$347,699
Electric power lines—miles, 251; assessed value	$130,269
Number of acres irrigated	3,500
Toll roads, 38 miles	$13,600

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	3,500	2,400	$84,000
Barley	11,000	8,000	280,000
Oats	350	300	10,500
Corn	100	50	2,000
Total cereals.	14,950	10,750	$376,500
Alfalfa hay	7,800	.....	$93,600
Grain hay	3,000	.....	36,000
Grass hay	9,000	.....	54,000
Total hay	19,800	.....	$183,600

STATISTICS OF SHASTA COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

Green—	*Pounds.*
Apples	104,000
Apricots	20,000
Asparagus	7,000
Blackberries	34,000
Cabbage	53,000
Cherries	9,000
Figs	10,000
Grapes	52,000
Loganberries	7,500
Nectarines	3,000
Onions	18,000
Olives	100,000
Pears	1,600,000
Peaches	1,175,000
Plums	100,000
Irish potatoes	190,000
Sweet potatoes	15,000
Prunes	3,000,000
Quinces	1,000
Raspberries	5,000
Strawberries	20,000
Tomatoes	55,000
Hops	2,500
Total	6,581,000

Dried—	*Pounds.*
Almonds	18,000
Apples	10,000
Apricots	4,000
Beans	32,000
Figs	28,000
Grapes	2,000
Pears	200,000
Peaches	275,000
Prunes	500,000
Total	1,069,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	16,000	3,000	19,000
Apricot	650	.....	650
Cherry	500	.....	500
Fig	800	.....	800
Lemon	350	250	600
Nectarine	100	.....	100
Olive	9,000	1,000	10,000
Orange	900	750	1,650
Peach	44,000	5,000	49,000
Pear	27,700	300	28,000
Plum	1,000	400	1,400
Prune	80,000	3,000	83,000
Quince	100	50	150
Other kinds	7,500	400	7,900
Total fruit trees.	188,600	14,150	202,750
Almond	3,500	500	4,000
Chestnut	100	.....	100
Walnut	250	200	450
Total nut trees.	3,850	700	4,550
Grapevines	75,000	.....	75,000
Berries, acres	200	.....	200

Dairy Industry.

	Production.	*Value.*
Butter, pounds	55,000	$16,500

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	625	$3,125
Ducks	50	400
Geese	50	500
Turkeys	600	18,000
Eggs	5,000	1,250
Total value		$23,275

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	5,000	$125,000
Stock	12,000	178,345
Dairy cows—Graded	695	27,800
Thoroughbred—		
Herefords	65	3,900
Holsteins	10	1,250
Jersey	325	16,250
Shorthorns	140	8,400
Calves	3,973	39,730
Swine	2,850	11,405
Horses—		
Thoroughbred	3	6,000
Standard-bred	6	6,000
Common	2,500	124,650
Colts	550	11,625
Jacks and jennies	60	420
Mules	90	6,750
Sheep	17,500	42,170
Lambs	14,000	14,000
Angora goats	500	2,500
Common goats	10,452	20,904
Cattle, yearlings	2,730	27,395
Total stock all kinds..	73,449	$675,494
Wool, pounds	87,500	.....
Mohair, pounds	2,250	.....

Wines, Brandies, Etc.

	Gallons.	*Value.*
Sweet wines	11,575	$2,315

Number of breweries, 1.

Fish Industry.

	Pounds.	*Value.*
Salmon	10,000	$1,000

Forest Products.

	Amount.	*Value.*
Area of timber lands, cedar, pine, redwood, acres	350,000	.....
Sawmills, number	6	.....
Charcoal, sacks	16,000	.....
Fuel, wood, cords	4,000	$10,000
Laths, thousand	80	.....
Lumber, feet	29,000,000	435,000
Posts, pieces	2,000	2,000
Shakes, thousand	700	5,600

Power used for mills and manufactories in county—Steam, 12.

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Brick	3	48	$42,000
Cigars	3	6	10,000
Confectionery	3	4	3,500
Flouring mill	1	5	35,000
Foundries and iron works	2	46	100,000
Lime	2	75	25,000
Meat products—			
Hides		....	25,000
Lard		....	7,200
Tallow		....	4,800
Pickles		....	4,400
Pickled olives		....	1,000
Planing mill	1	....	4,000
Granite and marble..	1	2	5,000

Manufactured Output.

	Quantity.
Brick, thousand	4,500
Cigars, thousand	200
Flour, barrels	3,000
Lime, barrels	15,000
Hides, pounds	250,000
Tallow, pounds	52,000

SIERRA COUNTY.

Sierra County has an area practically all mountainous. The altitude ranges from 2,000 to 8,600 feet, the highest elevation being that of the Sierra Buttes; but the greater portion has an elevation of from 4,000 to 5,000 feet.

The main ridge of the Sierra Nevadas crosses the eastern part from south to north. Several spurs traverse the county from east to west, forming the watersheds of the four principal streams which make the drainage system of the western part. These streams consist of the Middle Yuba River on the south, the North Yuba near the center, and Canyon Creek and Slate Creek on the north; and in the eastern end the many streams that form the headwaters of the Feather and Truckee rivers. Of the peculiar topographical features are the expansive valleys and lakes lying among the loftiest peaks of the Sierras. The lakes vary from one eighth of a mile to three or four miles in length, most of them circular, and, considering their small size, remarkable for their depth.

The important body of agricultural land is Sierra Valley. It extends over the boundary line into Plumas County, and is the largest and the most elevated of the valleys of the Sierras, being 4,750 feet above sea level. It is 30 miles in length and 10 in width. This valley is particularly adapted to stock raising and dairy purposes, and a fine quality of timothy and alfalfa hay is raised. There are several creameries in the valley, and a superior quality of butter is made, of which almost all is shipped to the outside. Considerable beef cattle are fattened for San Francisco and other markets, besides large shipments of sheep. The soil is a deep, black loam, largely admixed with rich vegetable mold, the result of ages of forest growth.

Since 1849 the principal industry has been gold mining. One hundred and ninety millions of dollars have been taken from its rivers, gravel deposits and quartz veins.

The greater portion is practically covered with a virgin belt of soft timber. The lumber cut runs into many millions of feet. The Floriston Paper Mill Company owns timber lands, and uses a large amount of Sierra County timber.

Population, according to census of 1900, was 4,017.

Average temperature winter 47 degrees, summer 72 degrees, summer nights are pleasantly cool.

Annual rainfall, about 60 inches.

Character of agricultural soil: black loam, very rich.

The principal towns are: Downieville, Forest City, Sierraville, Loyalton, Sierra City.

Natural products: white, yellow, and sugar pine, fir, spruce, and cedar, live stock, fruit, berries, and garden truck.

Manufactured products: lumber, boxes, sashes, doors, etc., creamery butter.

Minerals: gold, iron, copper, asbestos, and lime.

Irrigation and power facilities are unlimited.

Transportation facilities: The Boca and Loyalton Railroad, Central Pacific Railway, Nevada-California-Oregon Railway, and Hobart-Mills Railroad. Communication facilities: Sunset Telephone Company, Western Union Telegraph Company, and Sierra Valley Telegraph Company.

Educational facilities: first-class common and grammar schools.

Health resorts: Campbell's Hot Springs, Webber, Independence, and Gold Lakes.

Hunting and fishing abundant—trout, mountain quail, grouse, duck, snipe, deer, and bear.

STATISTICS OF SIERRA COUNTY, 1908-9.

General Statistics.

Area, 1,000 square miles, or 640,000 acres.	
Number of farms	110
Number of acres assessed	319,639
Value of country real estate	$1,278,430
Of improvements thereon	$256,135
Of city and town lots	$63,370
Of improvements thereon	$265,350
Of personal property	$288,899
Total value of all property	$2,155,194
Expended on roads, last fiscal year	$13,369
Expended for bridges, last fiscal year	$9,210
Number of miles of public roads	300
Road levy per $100, 1909	50c
Value of county buildings	$14,000
Railroads, steam—miles, 29.48; assessed value	$264,736
Electric power plants—4; assessed value	$5,750
Electric power lines—miles, 13½; assessed value	$2,000

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	366,000	$7,320
Cabbage	20,000	500
Cherries	8,000	400
Onions	8,000	200
Pears	14,500	435
Peaches	3,200	160
Plums	18,400	368
Irish potatoes	240,000	6,000
Strawberries	6,000	400
Totals	684,100	$15,783

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	241	136	$5,440
Barley	462	170	6,120
Oats	377	153	6,120
Rye	201	52	1,872
Total cereals.	1,281	511	$19,552
Alfalfa hay	1,138	1,525	$15,250
Grain hay	859	868	6,944
Grass hay	16,254	17,862	142,896
Total hay	18,251	20,255	$165,090

Wines, Brandies, Etc.

	Gallons.	*Value.*
Beer, barrels	260	$3,120

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	6,256	311	6,567
Cherry	224	40	264
Peach	358	25	383
Pear	413	17	430
Plum	390	14	404
Total fruit trees.	7,641	407	8,048
Chestnut	35	10	45
Walnut	42	10	52
Total nut trees.	77	20	97

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	3,400	$136,000
Stock	3,980	99,500
Dairy cows—Graded	1,850	83,250
Thoroughbred—		
Herefords	81	4,860
Shorthorns	83	4,980
Calves	1,850	14,800
Swine	1,060	6,360
Horses—		
Standard-bred	3	1,500
Common	995	79,600
Colts	230	6,900
Mules	57	4,560
Sheep	4,110	14,485
Lambs	1,410	4,230
Common goats	96	288
Total stock all kinds.	19,105	$461,313
Wool, pounds	15,560	$3,112
Mohair, pounds	200	40

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	212,200	$650,000
Pine	212,000	.....
Sawmills, number	18	169,000
Fuel, wood, cords	20,000	50,000
Lumber, feet	34,000,000	510,000
Logs	31,000,000	310,000
Pickets, pieces	3,000	60
Poles, feet	1,500,000	150,000
Railroad ties, pieces	190,000	76,000
Shingles, thousand	1,300	3,575
Total value		$1,918,635

Dairy Industry.

	Production.	*Value.*
Butter, pounds	296,000	$80,000

STATISTICS OF SIERRA COUNTY, 1908-9—Continued.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	1,570	$7,850
Ducks	14	98
Turkeys	4	48
Eggs	15,700	4,710
Total value		$12,706

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 115	.....	$575
Honey	3,000	300

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Meat products—			
Hides	.....	.....	$4,200
Lard	.....	.....	645
Tallow	.....	.....	468
Planing mills	3	107	215,000

Manufactured Output.

	Quantity.
Hides, number	1,400
Lard, pounds	4,300
Tallow, pounds	11,700

SISKIYOU COUNTY.

Siskiyou is one of the northern counties of the State, adjoining Oregon on the north for 80 miles. Of its area of 6,048 square miles 1,500 square miles are valley, the remainder is mountains and forests. Among the mountains are many farms and stock ranches well watered and wooded. It contains large areas of farming, mining, desert, swamp and timber lands. Much of the agricultural land is farmed without irrigation, producing good crops of wheat, oats, barley, rye and in some localities alfalfa and timothy. The so-called desert lands were long considered of little value save for pasturage, but are now being successfully farmed and require only the application of water to produce abundant crops. The swamp lands when drained are also exceedingly fertile. The Federal Government is at present engaged in a comprehensive plan of drainage and reclamation in the northeastern portion of this county and southern Oregon which contemplates the drainage of the swamp lands and the use of the water in the irrigation of the desert lands. This will make homes for thousands of settlers.

The mining section comprises the west half of the county and produces nearly one million in gold annually. A system of immense ledges of copper ores has recently been discovered which when more fully developed will add much to the mineral output. There are large deposits of iron ore, limestone, granite, and marble of the finest quality and sandstone that owing to the absence of lime is regarded as the best on the coast. The only jade mine in the United States is in the western portion of this county.

The agricultural lands are chiefly comprised in Scott Valley in the western portion of the county, Shasta Valley and Little Shasta in the central portion and McCloud and Butte Valley in the eastern portion. At the different elevations all fruits and vegetables common to the temperate zone thrive.

Timber is everywhere; there are thousands of sections that will cut from ten to twenty million feet of yellow and sugar pine, besides large quantities of red fir and cedar.

The Sierra Nevada and Coast Range mountains meet here. The altitude ranges from 2,000 feet in the valleys to 14,000 feet on the mountain peaks, the highest of these being Mount Shasta. There are localities where snow seldom falls and regions of perpetual snow; these conditions make it one of the most scenic of the counties.

Many of the swift mountain streams and water falls have been harnessed for electrical power. Chief among these is the Siskiyou Electric Power and Light Company's plant at Fall Creek, which is the third largest in the State, and furnish cheap and abundant power to all parts of the county. Electrical power sufficient to run the machinery of the entire State can be developed from the abundant water power.

The principal river is the Klamath which with its tributaries drain almost the entire county. This stream is not navigable and furnishes a natural dumping ground for the placer mines, its swift current carrying the tailings out to the ocean.

The Southern Pacific Railroad passes through the county from north to south, entering near Coles at the base of the Siskiyou Mountains and leaving it near Dunsmuir where are located its roundhouse and machine shops.

The scenic beauties and health giving springs abounding in all portions of the county makes this the mecca of the summer tourist and health seeker. The Marble Mountains now but little known to tourists will in time rival the Kings River Canyon and the Yosemite Valley. Chief among the noted resorts are the famous Shasta Springs. Neys Springs, Shasta Retreat, and Upper Soda Springs, all situated in the Sacramento River Canyon; 800,000 gallons of the waters of these springs are bottled annually. Sisson at the base of Mount Shasta, Garretsons Springs in the Siskiyou Mountains and the Klamath Hot Springs are noted health resorts. In all portions of the county fish and game abound making it an ideal field for the sportsman.

Some of the largest pine lumber mills on the coast are located here, chief among which are the McCloud River and Weed Lumber Company plants. Vast areas of the timber lands after the removal of the timber make valuable farms.

Lumbering is the chief industry with mining and live stock a close second and third.

The mountain ranges furnish splendid range during the summer season for thousands of horses and cattle. New gold mines are being discovered and old ones continue good with depth.

Yreka is the principal town, the courthouse, jail and hospital are splendid buildings. Two electric plants furnish light and power. The city owns its own water system. Water is obtained from the adjacent mountains and being filtered through gravel beds is as pure as any in the State.

All this added to our present prosperity, our temperate climate and natural advantages assure for Siskiyou a bright future.

Siskiyou is an inviting field for the homeseeker; by the last census returns there are but three inhabitants per square mile.

STATISTICS OF SISKIYOU COUNTY, 1908-9.

General Statistics.

Area, 6,048 square miles, or acres.	3,870,720
Number of farms	1,000
Number of acres assessed	1,890,830
Value of country real estate	$9,041,701
Of improvements thereon	$2,733,054
Of city and town lots	$347,920
Of improvements thereon	$684,375
Of personal property	$2,177,341
Total value of all property	$14,984,391
Expended on roads, last fiscal year	$65,600
Expended for bridges, last fiscal year	$14,300
Number of miles of public roads	1,100
Road levy per $100, 1909	40c
Value of county buildings	$100,000
Irrigating ditches, miles	300
Railroads, steam, miles	204.16
Electric power plants—4; assessed value	$72,650
Electric power lines, miles	155
Number of acres irrigated	35,000

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	14,000	4,000	18,000
Apricot	550	50	600
Cherry	875	100	975
Nectarine	100	.....	100
Peach	5,000	700	5,700
Pear	2,500	800	3,300
Plum	3,500	500	4,000
Prune	3,000	1,000	4,000
Total fruit trees.	29,425	7,150	36,575
Almond	50	.....	50
Walnut	500	.....	500
Total nut trees.	550	.....	550
Grapevines, acres.	25	.....	25
Berries, acres	100	.....	100

Fish Industry.

Not permitted to take salmon when here; caught only for sport.

STATISTICS OF SISKIYOU COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	90,000	50,000	$1,500,000
Barley	10,000	5,000	150,000
Oats	15,000	8,000	200,000
Rye*	10,000	.....	.....
Corn	500	.....	.....
Total cereals	125,500	63,000	$1,850,000
Alfalfa hay	30,000	95,000	$950,000
Grain hay	12,000	24,000	240,000
Grass hay	12,000	30,000	300,000
Total hay	54,000	49,000	$1,490,000

*Cut for hay.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	500,000	$10,000
Beans	40,000	2,000
Beets	300,000	3,000
Cabbage	200,000	4,000
Celery	10,000	1,000
Cauliflower	10,000	200
Onions	75,000	1,500
Pears	20,000	400
Peaches	15,000	600
Plums	30,000	600
Irish potatoes	1,600,000	24,000
Strawberries	9,000	900
Tomatoes	25,000	500
Total value		$48,700

Wines, Brandies, Etc.

	Gallons.	*Value.*
Natural mineral water	800,000	$100,000

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 3,500	.....	$17,500
Honey	100,000	10,000

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	6,500	$260,000
Stock	31,800	636,000
Dairy cows—Graded	4,100	164,000
Calves	14,100	210,500
Swine	7,000	70,000
Horses—		
Thoroughbred	19	19,000
Common	3,000	300,000
Colts	1,200	30,000
Jacks and jennies	120	12,000
Mules	600	60,000
Sheep	11,000	44,000
Common goats	500	1,500
Total stock all kinds	79,939	$1,807,000
Wool, pounds	60,000	$12,000
Mohair, pounds	2,000	400

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	5	.....	.....
Cheese, pounds		600,000	$200,000
Condensed milk, cs		25,000	6,250

Most of cream is shipped out of State.

Forest Products.

	Amount.	*Value.*
Area of timber lands, acres	2,000,000	$30,000,000
Sawmills, number	45	.....
Lumber, feet	150,000,000	3,000,000

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Wood boxes	4	....	$750,000
Flouring mills	3	....	25,000
Foundry and iron works	1	....	6,000

Jewelry, 5; leather goods, 4; lime, 4; malt, 3.

Manufactured Output.

	Quantity.
Cigars	200,000

SOLANO COUNTY.

Nestled in the foothills of the Coast Range on its western border, and extending across broad acres of the most fertile land in bounteous California till its eastern confines are marked by the majestic Sacramento River, lies Solano County. It is, in part, in the Sacramento Valley, the great stream of northern California breaking through Solano's hills in the onward rush of ages toward the sea, and thousands of its acres being in the vast area that has been a world's granary for years, its products going to all lands. A quarter of a million acres, nearly half of Solano's area, is devoted to grain raising. The wheat grown here is the best milling wheat produced in the State. Thousands of cattle, horses, and sheep graze on the upland pastures and marsh lands, and great industrial establishments pay fortunes in wages annually, but the brightest gem in the diadem of resources and industries that marks the county's unquestioned leadership is the fruit produced in its sheltered valleys, a product that has made the county famous far and wide. The first deciduous fruit sold in the United States each year is grown in Solano County, where are several sequestered valleys, with gently rising slopes, sheltered by ranges of high hills that bar the egress of moisture-laden clouds in one season and shut out the hot, dry winds of another. Here the trees bloom in February and the fruit forms rapidly, ripening beneath the genial heat of the spring season, which is really early summer. In early April the shipments begin and continue until late fall. The soil is unexcelled, even in California, for productiveness, and the fruit raised on the limited area is sold for millions of dollars annually, returning fortunes to the orchardists of this favored section. Citrus fruits are marketed here a month ahead of the southern California products.

In the eastern section of the county, where the enterprise of man has wrested broad acres from overflow, is another fabulously rich section, the delta lands of the Sacramento River being noted for their productiveness. In addition, many large industrial establishments are located within the county, a great majority of the people being prosperous wage workers, whose yearly earnings, with the resources of the soil, the products of field, farm, and factory, make a story of wealth and prosperity that seems incredible, the income of the county from all sources exceeding the princely sum of twenty-two million dollars per year.

This favored section is of a limited area. From east to west its extreme length is 45 miles, while from north to south the county measures 35 miles. The surface of the county is 911 square miles, or 583,000 acres, of which 40,000 acres are water, included in the Sacramento River and Suisun and San Pablo bays. Besides its great natural resources, or rather because of them, Solano County ranks as one of the strongest counties in California, from a financial view-point. There is not a dollar of county debt, either bonded or floating. Three communities—Vallejo, Suisun, and Rio Vista—own their own water systems and supply their inhabitants at rates at least fifty per cent

lower than those paid in cities depending upon private capital for this essential necessity. The real property and improvements in the county are worth, at a conservative valuation, $30,000,000, while the mortgages amount to the comparatively insignificant sum of $2,666,000, the major portion of which is represented in money invested in home building within the municipalities. The enormously rich agricultural and horticultural holdings are practically free of incumbrance.

The tax rate for county purposes is from $1.00 to $1.10 on the $100.00 outside incorporated cities and towns, and 40 cents less inside, where no levy is made for road purposes. The expenditures, while by no means extravagant, are liberal for school, road, and hospital expenses. The county salary roll, including township officers, is about $45,000 per year. The sum of $50,000 to $60,000 is annually spent on the roads, which are maintained in excellent condition throughout the year. Public schools cost over $130,000 per year, of which $37,500 is raised in the county tax. The sum of $17,500 is spent sprinkling the roads, and over $11,000 for the expense of the homeless, sick, and indigent.

As in other respects, Solano County is greatly favored in climate. The rainy months are from November to March, with desultory rains a month or six weeks earlier and later. The dry season is from six to eight months. Grain and hay are kept in the field till hauled for shipment. Snow and hail are practically unknown, and frosts rarely do any damage to even delicate plants. The average rainfall is sixteen to twenty inches, though it is greater in the fruit-growing sections. Intense cold is unknown, and at Mare Island Navy Yard and other industrial plants hundreds of men work in the open air the year round. In summer the heat is never oppressive, rarely going above 100 degrees Fahrenheit. The nights are cool, a breeze from the ocean coming each day at sunset, cooling the atmosphere, and greatly adding to the health and comfort of the people.

The population in 1900 was 24,193, and is now estimated at 30,000, of whom nearly one half live in Vallejo and Benicia, the industrial centers of the county. The county could easily support double its present population.

The land of Solano County varies in the purposes for which it is adapted, the following table having been compiled by E. N. Eager, when county surveyor, to show the area available for different modes of cultivation:

No. 1 fruit land	53,000 acres.
No. 2 fruit or No. 1 grain land	240,000 acres.
No. 2 grain or No. 1 pasture land	75,000 acres.
Pasture land	45,000 acres.
Mountainous grazing land	30,000 acres.
Marsh or tule land	100,000 acres.
Water	40,000 acres.

STATISTICS OF SOLANO COUNTY, 1908-9.

General Statistics.	
Area, 911 square miles, or 583,000 acres.	
Number of farms	3,000
Value of country real estate	$10,228,670
Of improvements thereon	$2,183,681
Of city and town lots	$2,153,994
Of improvements thereon	$3,137,446
Of personal property	$2,454,887
Total value of all property	$20,158,678
Expended on roads, last fiscal year	$81,410
Number of miles of public roads	700

General Statistics—Continued.	
Road levy per $100, 1909	40c
Value of county buildings	$300,000
Railroads, steam—miles, 73.45; assessed value	$1,800,000
Railroads, electric—miles, 3.5; assessed value	$34,000
Electric power plants	1
Electric power lines—miles; 113½; assessed value	$159,150
Number of acres irrigated	2,000

STATISTICS OF SOLANO COUNTY, 1908-9—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	2,000	.....	2,000
Apricot	225,000	.....	225,000
Cherry	40,000	.....	40,000
Fig	5,000	.....	5,000
Lemon	3,000	.....	3,000
Nectarine	2,500	.....	2,500
Olive	3,000	.....	3,000
Orange	8,000	.....	8,000
Peach	490,000	100,000	590,000
Pear	200,000	10,000	210,000
Plum	109,400	.....	109,400
Prune	400,000	100,000	500,000
Quince	500	.....	500
Other kinds	10,000	.....	10,000
Total fruit	1,498,400	210,000	1,708,400
Almond	85,000	.....	85,000
Walnut	5,000	.....	5,000
Total nut	90,000	.....	90,000
Grapevines, acres	3,000	.....	3,000

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apricots	5,000,000	$100,000
Blackberries	18,000	2,000
Beans	3,000,000	68,000
Corn	75,000	3,000
Cherries	1,600,000	80,000
Figs	200,000	6,000
Nectarines	50,000	4,000
Pears	8,250,000	165,000
Peaches	2,400,000	48,000
Plums	1,440,000	30,000
Irish potatoes	2,000,000	20,000
Quinces	50,000	500
Tomatoes	150,000	6,000
Totals	24,233,000	$532,500
Dried—	Pounds.	Value.
Almonds	500,000	$50,000
Apricots	1,000,000	100,000
Figs	10,000	250
Nectarines	100,000	5,000
Pears	2,000,000	100,000
Peaches	4,000,000	160,000
Plums	200,000	4,000
Prunes	10,000,000	300,000
Walnuts	50,000	1,000
Totals	17,860,000	$720,250
Canned—	Cases.	Value.
Apricots	300	$1,000
Blackberries	800	4,000
Cherries	400	1,600
Pears	500	1,500
Peaches	800	2,400
Tomatoes	8,000	24,000
Totals	10,800	$34,500

Forest Products.

	Amount.	Value.
Fuel, wood, cords	18,000	$72,000

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 400	.....	$350
Beeswax	480	100
Honey	3,000	.....

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	130,000	15,500	$450,000
Barley	55,000	22,000	620,000
Oats	6,000	18,000	40,000
Total cereals	191,000	55,500	$111,000
Alfalfa hay	8,000	40,000	$320,000
Grain hay	2,000	8,000	96,000
Total hay	10,000	48,000	$416,000

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	600,000	$72,000
Beer, barrels	25,000	150,000
Brandy	2,000	1,200
Vinegar	800	200

Number of wineries, 3; distilleries, 3; breweries, 3.

Fish Industry.

	Pounds.	Value.
Salmon	200,000	$11,000

Dairy Industry.

	No.	Production.	Value.
Creameries	6	.....	.....
Butter, pounds		4,000,000	$800,000
Cheese, pounds		5,000	500

Live Stock Industry.

	Number.	Value.
Cattle—Beef	56,000	$1,650,000
Stock	1,000	20,000
Dairy cows—Graded	6,000	175,000
Thoroughbred—Angus	1,500	65,000
Shorthorns	100	10,000
Calves	2,000	9,000
Swine	5,000	20,000
Horses—Thoroughbred	100	25,000
Standard-bred	1,000	110,000
Common	5,000	50,000
Colts	200	15,000
Jacks and jennies	1,000	130,000
Sheep	130,000	260,000
Total stock all kinds	208,900	$2,539,000
Wool, pounds	65,000	$15,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	4,000	$16,000
Ducks	40	240
Geese	10	180
Turkeys	200	7,200
Eggs	500,000	150,000
Total value		$173,620

Manufactories.

	No.	No. of Empl's.	Value of Product.
Cement	1	700	$2,000,000
Flouring mills	2	150	1,800,000
Foundries and iron works	1	100	180,000
Tanneries	3	350	2,000,000

Manufactured Output.

	Quantity.
Cement, barrels	1,460,000
Flour, barrels	360,000

SONOMA COUNTY.

Sonoma County is bounded on the west by the Pacific Ocean, for more than 65 miles that boundary conforming to the irregularities of the shore, while on San Pablo Bay it has a frontage of 20 miles.

There is no sameness in the surface of the county. Variety is a leading characteristic. Valleys and hills and mountains appear to have been planned and distributed to give the best effect. The great central valley extends the entire length of the county from south to north, and commands attention by remarkable fertility. The area on which rough stone interferes with farming operations is small. Out of the area of land in the county at least 200,000 acres are valley land, the richest soil known, being a black loam; 200,000 acres are rolling or higher tableland, of an exceedingly rich alluvial brown soil; with considerable sand. This is the best fruit land. We may class 200,000 acres as foothill lands, adapted to many kinds of agricultural and horticultural products and pasturage. At least 100,000 acres of mountain land are adapted to grazing, and about 80,000 acres are covered with redwood timber of a magnificent growth.

On the coast line are several small but valuable harbors, bays, and beaches.

Sonoma Valley is about 20 miles in length, with an average width of 8 miles. It lies parallel to Petaluma Valley, from which it is separated by a range of mountains.

The streams and water courses of Sonoma County are numerous. Russian River, the largest stream, enters on the north, flows in a southeasterly direction for 20 miles, turns at Fitch Mountain, and finds its way to the largest depression in the Santa Rosa basin, from which it breaks through a gap in the Coast Range to the Pacific Ocean. This river gathers the waters from three fifths of the area of the county.

Sonoma County, besides her great wine, fruit, dairy, stock, and other large industries, produces as much poultry and eggs as all the balance of the State put together. The advantages of the poultry and egg industry are its nearness to a reliable market, quick cash returns, and length of season. The vicinity of Petaluma is largely devoted to this industry; possibly one half of the poultry and eggs shipped from the county are from there. On an acre of ground can be raised and kept successfully 400 laying hens the year round. These chickens, with ordinary care and attention, such as an intelligent and industrious man would give to any business, will net the owner from $1 to $1.25 a hen clear profit a year, over and above the cost of feed, which is all purchased and paid for, except such as vegetables, kale, and feed raised in the garden. With a few acres well stocked with chickens a family can make a good, independent living. The poultry business is like the banking business—cash on the spot, and there is no surer road to success than along the chicken route in Sonoma County.

Cattle are raised on a large scale, principally for dairying purposes.

Our grazing land is unsurpassed. In the valley lands it requires about 5 acres per cow per year for dairying purposes; in the hill lands from 10 to 15 acres per cow. In the northern part of the county sheep raising forms an important industry. Much of the coast region is devoted to pasturage purposes.

The moisture that rises from the ocean near the coast is absorbed by the ground, and from this fact the pastures are kept green nearly the year round, making this section the ideal spot for the dairyman and stock raiser. The breeds of milch cows represented are mostly Jerseys, Holsteins, and Ayrshires, with some strains of Durhams, and fine American breeds. All milk used at the creameries is bought and sold by weight. In well-managed dairies the yield of butter per cow per annum is from 150 to 200 pounds.

The value of the growth of stock cattle is $10 per head per year, until the limit is reached, and this without other feed than that obtained by grazing upon lands valued at from $10 to $40 per acre.

In the production of hops Sonoma County leads the world. There is no other county that can produce the quality equal to a choice Sonoma. Nearly all other hop-raising sections, outside of a few counties in this State, are subject to crop failures, caused chiefly by vermin, mold, honeydew, rust, red spider, or severe storms. Such calamities are unheard of in this county. During the hop harvest the growers are favored with bright, sunshiny days. The very best quality of soil—and there is plenty of it—together with an excellent climate, is required for a successful culture of hops. In New York State hops grow on elevated land, while in Sonoma County the rich, sandy loam of the river and creek bottoms is employed. The richness of the soil, together with the adaptable climate, assures an average crop of about 1,800 pounds of dried hops to the acre. Most of the hops are shipped to Eastern and European markets, but there is a growing demand for our product in Australia, New Zealand, and the Orient.

This county produces large quantities of wheat, oat, barley, and alfalfa hay. Good hay can be raised wherever one can plow. It is harvested in May and June.

The soil is particularly adapted to oats, which many consider the most profitable of our grain crops. However, wheat, barley, and corn are extensively cultivated in every locality at a splendid profit. Corn is grown mostly on river-bottom land, and yields on an average 65 bushels to the acre.

One of the chief industries is fruit growing. The estimated value of a fruit tree from the time it is planted to the time it comes into bearing is $1 per year. The right season for planting is during February and March. While many fruit driers are operated, many authorities prefer the sun-drying process, which involves no expense and can always be relied upon. The sun-dried product is of superior quality and flavor, and will bring a correspondingly higher price.

The peach is a great favorite, as the trees commence to bear the second year after planting. The soil best suited to them is a sandy loam, and they may be cultivated with equal success either on the hillsides or in the valleys. After the trees come into bearing the income will depend principally upon the care bestowed upon them. Peaches of standard size for the market are those that will fill a 2-inch hole. If

larger they are called "extras," and if smaller, "seconds." The latter are mostly used for drying. All varieties of the peach thrive.

Prunes should have the best quality of soil, for the tree is a heavy bearer.

The growing of citrus fruits, though comparatively a recent industry, has gained a strong foothold, and present indications point to a steady increase in acreage.

While the olive requires a good, well-drained soil, there are many orchards that are planted around the rocky foothills. They come into bearing after five or six years. Olive culture is making rapid strides. The oil produced has established an excellent reputation, and is usually sold ahead of its production.

Sonoma County is the true home of the English walnut. It is only recently that the walnut has attracted the attention of growers in this county, but now that its possibilities as a money-maker are becoming more widely known, the acreage devoted to its cultivation is rapidly increasing, and it promises to become one of our great industries.

Sonoma is the greatest blackberry county. The blackberry season begins in the latter part of June, and runs into September. Raspberries are harvested in May, June, July, and August.

Gooseberries are a valuable product, and here are raised the largest and finest varieties.

Many strawberries are not shipped, most of the supply being used for home consumption, but those raised are of the very best quality.

Sonoma grows vegetables throughout the year, and often raises from two to three crops annually. Potatoes are grown in almost every section, attain large size, and are of the finest quality. Asparagus is particularly adapted to the soil and climate. Tomatoes are produced in great quantities for canning. String beans are also grown extensively for this purpose. Sonoma watermelons are of large size and fine flavor.

Sonoma is the largest and most important grape and wine producing county in the State. Her wines are justly famed throughout the world, and took first premium at the Genoa Exposition in Italy in 1892. A gold medal was awarded at the World's Fair in Chicago in 1893, and also at the Midwinter Fair in San Francisco in 1894; and the grand prize, the highest award, was given her wines at the St. Louis World's Exposition by a jury composed of twenty-one members, most of whom were French and German experts. In order to accommodate the enormous yield of its own section alone, one wine company has erected a wine tank with a capacity of half a million gallons, the largest in the world.

Tobacco growing has made a fair start, and is one of the coming industries. The plant will thrive in almost every section, and is now quite extensively grown and manufactured in many localities, and the quality is excellent. David Hetzel has raised tobacco for many years near Guerneville.

The amount of lumber manufactured by the sawmills runs into millions of feet. A large amount of shingles, pickets, and shakes is made in the county.

John Schindler, near Melitta, has several hundred tea plants in his garden, and thinks he will be able to place his tea on the market in a year or so.

Labor commands good prices, especially competent and experienced farm hands.

Sonoma County has a large number of mineral springs.

The principal cities are: Santa Rosa, Sonoma, Petaluma, Healdsburg, Cloverdale, and Sebastopol.

The Japan current gives us unfailing rains, and regulates the temperature both summer and winter.

Compared with the East, our roads are more solid and permanent. This is due to the absence of excessive frosts, which crack and break up the hardest ground, of whatever material it is composed.

The many and varied health-giving mineral waters, fishing and hunting locations, and summer resorts, make this county a paradise for the pleasure seeker. Thousands of visitors spend the summer living in tents pitched along the many beautiful streams and in the numerous picturesque spots.

STANISLAUS COUNTY.

Stanislaus County lies about 100 miles southeast of San Francisco at the head of the San Joaquin Valley, and 30 miles from tidewater. The surface of the greater part of the county is a level plain until it merges into the foothill and mountain region in the east and west, and is drained by three rivers, the Tuolumne, Stanislaus, and San Joaquin rivers, which are navigable part of the year.

The soil of the eastern part of the county is generally sandy, merging into a sandy loam as it approaches the foothills, on the west a rich loam, on the north a rich, heavy loam. South of the Tuolumne River the soil is generally sandy.

The south central portion of the county is especially adapted to the culture of melons, of both varieties, and sweet potatoes, which during the last five years have been grown extensively and found profitable and productive. In most parts of the irrigated section of the county alfalfa grows extremely well, and the county owing to this product has become one of the foremost counties of the State in dairy products.

Dairying is the most profitable industry in the county. The dairy products in the past year have amounted to more than $1,200,000. Fruit and vines are also largely cultivated, and this industry is increasing each year.

There are three separate irrigation districts. The Modesto-Turlock, joint districts between the Tuolumne and Stanislaus, and between the Tuolumne and Merced rivers, one west of the San Joaquin River and one bordering on the Stanislaus both on the north and south. These three districts now hold nearly 90,000 acres of land under irrigation.

The county has four nearly parallel lines of railroads throughout the entire length, three lines of the Southern Pacific, and one Santa Fe, and in the northern part of the county the Sierra road that taps the mountain region.

In the eastern portion of the county a large gold dredging outfit has been at work during the past three years, and the returns in gold are reported to be large. But for obvious reasons, no returns can be made on this industry.

The county seat, Modesto, is a pretty, thriving city that has doubled in population in the past two years. Turlock, Oakdale, and Newman are also thriving towns that are rapidly increasing in size and population.

STATISTICS OF STANISLAUS COUNTY, 1908-9.

General Statistics.	
Area, 1,486 square miles, or 951,040 acres.	
Number of farms	3,800
Number of acres assessed	874,000
Value of country real estate	$9,510,715
Of improvements thereon	$1,309,045
Of city and town lots	$898,050
Of improvements thereon	$1,491,920
Of personal property	$2,322,030
Total value of all property	$15,531,760
Expended on roads, last fiscal year	$43,124

General Statistics—Continued.	
Expended for bridges, last fiscal year	$19,810
Number of miles of public roads	820
Value of county buildings	$80,000
Irrigating ditches, miles	373
Railroads, steam—miles, 126.36; assessed value	$2,820,863
Electric power plants	2
Number of acres irrigated	88,236

STATISTICS OF STANISLAUS COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	950,000	$9,500
Apricots	361,000	4,500
Asparagus	10,000	500
Blackberries	20,000	2,000
Beans	100,000	2,500
Beets	50,000	1,000
Cabbage	40,000	800
Celery	5,000	500
Cauliflower	40,000	800
Corn, Egyptian	6,750,000	101,250
Cherries	13,270	1,096
Figs	612,000	18,360
Grapes	8,040,000	30,080
Grape fruit	200	60
Limes, boxes	5,000	300
Lemons, boxes	22,300	.....
Loganberries	10,000	800
Nectarines	6,000	60
Onions	500,000	5,000
Oranges, boxes	48,160	48,160
Olives	264,500	4,000
Pears	358,000	4,275
Peaches	1,132,750	12,000
Peas	52,500	2,000
Plums	789,300	8,000
Irish potatoes	500,000	5,000
Sweet potatoes	35,540,000	355,400
Prunes	1,317,600	13,176
Quinces	14,400	288
Raspberries	5,000	400
Strawberries	10,000	500
Tomatoes	58,900	2,320
Watermelons	17,584,000	30,770
Cantaloupes	3,600,000	36,000
Total value		$701,397

Dried—	*Pounds.*	*Value.*
Almonds	42,370	$3,390
Apricots	11,000	935
Figs	244,000	7,320
Pears	8,000	400
Peaches	270,000	1,350
Prunes	100,000	5,000
Raisins	280,000	6,000
Walnuts	240,000	6,000
Totals	896,370	$54,295

Canned—	*Cases.*	*Value.*
Apricots	5,244	$10,447
Peaches	15,448	30,814
Peas	35,000	66,500
Tomatoes	5,120	7,168
Pumpkins	4,500	6,750
Totals	65,312	$121,679

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	22,872	$102,924
Ducks	100	400
Geese	50	300
Turkeys	200	3,600
Eggs	922,600	278,780
Total value		$386,004

Wines, Brandies, Etc.

	Gallons.	*Value.*
Dry wines	20,000	$4,000

Number of wineries, 1; distilleries, 2.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	136,280	11,982	$413,400
Barley	101,200	34,216	855,400
Oats	27,490	13,878	443,936
Rye	2,170	1,078	21,560
Corn	2,545	500	15,000
Total cereals	269,685	61,654	$1,749,296
Alfalfa hay	60,120	360,720	$2,885,760
Grain hay	6,000	9,000	108,000
Grass hay	1,000	1,500	12,000
Total hay	67,120	371,220	$3,005,760

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	4,750	1,043	5,793
Apricot	9,025	30,925	39,950
Cherry	1,370	1,150	2,520
Fig	6,120	160,178	166,298
Lemon	2,230	3,090	5,320
Nectarine	60	120	180
Olive	5,290	10,660	15,950
Orange	10,320	14,238	24,558
Peach	45,310	316,417	361,727
Pear	3,580	6,591	10,171
Plum	5,260	7,480	12,740
Prune	6,888	6,043	12,931
Quince	96	70	166
Limes	77	82	159
Total fruit trees	100,376	588,027	658,463
Almond	8,474	59,020	67,494
Walnut	4,653	3,449	8,102
Total nut trees	13,127	62,469	75,596
Grapevines, acres	1,005	7,315	8,320
Berries, acres	60	.....	60
Muskmelons, acres	658	.....	658
Watermelons, acr.	380	.....	380
Artichokes, acres	1	.....	1
Garden truck, acr.	1,050	.....	1,050
Peanuts, acres	7	.....	7
Tomatoes, acres	50	.....	50
Sunflowers, acres	16	.....	16
Sorghum, acres	12	.....	12

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,259	$18,910
Stock	12,779	148,060
Dairy cows—Graded	13,166	254,680
Thoroughbred—		
Holsteins	20	2,000
Jersey	200	20,000
Calves	6,259	44,950
Swine	7,300	73,000
Horses—		
Thoroughbred	60	6,305
Standard-bred	951	50,840
Common	6,188	257,110
Colts	1,896	48,190
Jacks and jennies	70	4,245
Mules	3,622	250,660
Sheep	28,340	54,890
Lambs	14,061	9,110
Angora goats	197	600
Mule colts	685	23,460
Total stock all kinds	97,073	$1,273,910
Wool, pounds	226,720	$31,741

STATISTICS OF STANISLAUS COUNTY, 1908-9—Continued.

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 1,500	....	$1,500
Beeswax	18,750	287
Honey	56,250	2,375

Manufactories.

	No.	*No. of Empl's.*	*Value of Product.*
Cigars	2	6	$7,700
Confectionery	3	7	7,500
Flouring mill	1	12	92,125
Leather goods	7	16	35,000
Meat products—			
Hides	..	....	14,944
Lard	..	....	3,000
Tallow	..	....	519
Olive oil	..	....	900
Tanneries	1	6	6,750
Ice	2	8	10,000
Mealfalfa	1	....	7,200
Fruit juice	1	30	75,000

Forest Products.

	Amount.	*Value.*
Fuel, wood, cords	1,500	$6,000

Power used for mills and manufactories in county—Steam, 15; electrical, 10; gasoline, 8; water, 2.

Dairy Industry.

	No.	*Production.*	*Value.*
Creameries	3	5,214,088	$556,169
Butter, pounds	..	2,033,052	677,684

Manufactured Output.

	Quantity.
Cigars	140,000
Flour, barrels	16,750
Hides, pounds	13,500
Lard, pounds	30,000
Olive oil, gallons	450
Ice, tons	1,000
Mealfalfa, tons	400

SUTTER COUNTY.

Sutter contains about 384,000 acres, of which at least 350,000 are or may be made susceptible of the most intensive cultivation. The greater part of the county lies between the Sacramento and Feather rivers, the remainder being on the east side of the Feather in the southern part of the county. In the northwestern portion are the Sutter Buttes, an isolated group of low mountains, entirely surrounded by the floor of the Sacramento Valley, and covering only about 25,000 acres of land, the greater portion of which is only fit for pasture land.

About 120,000 acres of this level land is known as tule or swamp and overflowed land, being subjected to inundation during several months of the winter and spring. Portions of this land have been reclaimed and now constitute some of the most fertile areas of the county, and these reclaimed lands are held at highest valuation of any unimproved land in the county. Lying at about the summer water level of the Sacramento River, they need no irrigation, and most abundant crops of everything can be grown with the expense and labor of artificially applied moisture, and at the same time with the absolute certainty that there will be sufficient. There remain many square miles of this tule land yet to be reclaimed. District 70 in the northwestern part embraces about 20,000 acres entirely reclaimed, while new districts have been formed looking toward the reclamation of about 50,000 acres more.

The strip of country lying adjacent to the west bank of the Feather River and extending from the north line of the county south for 30 miles and from 5 to 6 miles wide constitutes one of the great fruit belts of the State. Here is to be found the largest Thompson Seedless vineyard in the world—this grape now so noted having first been commercially made a success in Sutter County. Here are to be found a large number of small 10 and 20-acre fruit farms, which have been uniformly successful, and here are opportunities for many more, and land to be had at reasonable prices for the newcomer who desires to embark in the enterprise.

Yuba City, the county seat, is a town of about 1,200 people, with two canneries, a large packing house, flour mills, two newspapers, a strong bank, school of five teachers, two churches, and many fine residences.

Other towns are Meridian, on the Sacramento River, Live Oak, on the Southern Pacific and Northern Electric railroads, near the northern end, and Nicolaus, on the Feather River, in the southern part of the county.

Ample accommodation for passengers and freight are furnished by the Southern Pacific, Western Pacific, Northern Electric, and river boats.

STATISTICS OF SUTTER COUNTY, 1908-9.

General Statistics.

Area, 601 square miles, or 384,079 acres.	
Number of farms	1,320
Number of acres assessed	380,000
Value of country real estate	$8,861,000
Of improvements thereon	$1,681,800
Of city and town lots	$412,200
Of improvements thereon	$981,400
Of personal property	$2,719,000
Total value of all property	$14,656,400
Expended on roads and bridges, last fiscal year	$250,000
Number of miles of public roads	756
Road levy per $100, 1909	40c
Value of county buildings	$40,000
Irrigating ditches—miles, 10; cost	$12,500
Railroads, steam—miles, 36.63; assessed value	$946,995
Railroads, electric—miles, 30.10; assessed value	$170,318
Electric power lines—miles, 46.75; assessed value	$23,375
Number of acres irrigated	8,500

Dairy Industry.

	Production.	*Value.*
Butter, pounds	733,300	$220,000
Cheese, pounds	465,000	51,000

Creameries, 2; skimming stations, 2.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	1,500	$60,000
Stock	4,100	102,500
Dairy cows—Graded	4,055	162,200
Calves	3,000	36,000
Swine	2,700	32,400
Horses—Thoroughbred	9	10,800
Standard-bred	410	82,000
Common	2,150	172,000
Colts	1,020	81,600
Jacks and jennies	40	8,000
Mules	1,960	274,400
Sheep	33,170	99,510
Lambs	22,100	44,200
Total stock all kinds	76,114	$1,165,610
Wool, pounds	309,500	$46,425

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	10,325	$61,950
Turkeys	2,450	49,000
Eggs	.....	148,800
Total value		$259,750

Miscellaneous Products.

	Pounds.	*Value.*
Bees, hives, 11,500	.....	$4,000
Honey	53,000	3,710
Hops	80,000	20,000
Alfalfa seed	130,000	23,400

In this county there is one flouring mill that employs eight people, and has an output valued at $140,000.

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	4,700	1,535	6,235
Apricot	4,100	.....	4,100
Cherry	1,930	350	2,280
Fig	6,440	16,000	22,440
Lemon	390	250	640
Olive	1,453	400	1,853
Orange	5,300	300	5,600
Peach	155,740	37,900	193,640
Pear	8,500	500	9,000
Plum	2,250	150	2,400
Prune	58,700	4,000	62,700
Total fruit	249,503	61,385	310,888
Almond	65,300	30,000	95,300
Walnut	470	150	620
Total nut trees	65,770	30,150	95,920
Grapevines, acres	3,390	1,105	4,495
Berries, acres	15	.....	15

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	26,000	10,920	$414,900
Barley	21,000	18,900	529,200
Oats	3,000	2,000	50,000
Corn	1,160	1,560	27,880
Total cereals	51,160	33,380	$1,021,980
Alfalfa hay	3,760	30,080	$210,560
Grain hay	35,400	70,800	566,400
Total hay	39,160	100,880	$776,960

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	800,000	$12,000
Apricots	240,000	1,800
Asparagus	120,000	2,400
Blackberries	24,000	960
Cabbage	60,000	450
Cherries	85,000	3,400
Grapes	3,040,000	15,200
Peaches	15,514,000	155,140
Plums	556,000	5,700
Irish potatoes	2,265,000	19,385
Totals	22,704,000	$216,435
Dried—	*Pounds.*	*Value.*
Almonds	350,000	$38,500
Beans	972,000	38,800
Figs	180,000	4,050
Prunes	4,000,000	80,000
Raisins	4,500,000	202,000
Total value		$363,350
Canned—	*Cases.*	*Value.*
Peaches	45,000	$95,000

Fish Industry.

	Pounds.	*Value.*
Salmon	60,000	$3,600

TEHAMA COUNTY.

Tehama County occupies the upper or northern portion of the Sacramento Valley. It is 200 miles north of San Francisco, and 120 miles north of Sacramento. Part of its eastern boundary follows the summit of the Sierra Nevada Mountains, and its western boundary lies along the summit of the Coast Range. Its greatest length is 78 miles; its width from north to south, 38 miles. Of its area, speaking roughly, 700,000 acres are agricultural lands, 800,000 grazing, and 500,000 timber.

Red Bluff is the county seat. It is a clean, modern little city, located upon an elevated plain, with superior drainage, and with the Sacramento River washing the foot of the bluffs on one side. Other towns are Corning, Tehama, Vina, Paskenta, and Kirkwood.

The county is easily reached, being on the line of the California and Oregon branch of the Southern Pacific Railroad. Two lines of this road converge at the town of Tehama, 12 miles below Red Bluff; one coming up the valley on the west side, and the other on the east side of the Sacramento River. North of Tehama there is but one line of track. The Sacramento River is navigable to Red Bluff, and steamboats from San Francisco and Sacramento make weekly trips up and down during most of the year.

Telegraph and telephone lines follow the railroad, and several private lines are in operation.

The public school system is complete and excellent. A school is maintained wherever there is need of one.

The Sacramento River runs through the county from north to south. From this river there is a rise to the east and west until the summit of the mountain range is reached. South of Red Bluff and west of the river lie broad plains; beyond these rolling hills developing into the foothills of the mountains, and then the mountains themselves, which rise quite abruptly to a height of from 3,000 to 9,000 feet.

In the alluvial land along the river the soil is mainly a dark brown, almost black, sandy loam, rich and deep. The table-land to the east is so rocky as to be of no use except for stock raising. On the west of the river the loamy lands merge into clayey loam second bottom; farther west is the sandier soil of the plains, gray, brown, and red in color; then the hills with reddish soil and gravelly loam. The creek bottoms have generally a yellowish soil. North of Red Bluff, in the hilly country, it is chiefly reddish clay and gravelly loam.

Tehama County is well watered. Numerous creeks carry streams from the mountain snows to the river. Wells can be dug anywhere to reach water at a moderate depth.

Irrigation is really not necessary, but experience has shown that plenty of water means an increase in product and variety. It is practiced to some extent, but mostly for the cultivation of alfalfa. There is a great deal of unappropriated water available for irrigation and the development of electric power, awaiting only the capital and energy to make it return a large profit.

The principal industries are horticulture, agriculture, stock raising, and lumbering. There is practically no mining. A large deposit of chrome ore to the west, valuable sulphur springs to the east; some indifferent placer claims to the north, and the story of mining is told.

The fruit industry gives employment to a large number of people, who can engage in healthful outdoor work in summer. Several thousand persons are directly or indirectly engaged in some branch of the fruit business.

Olives are fast coming into favor as a crop and as a food. The tree grows rapidly and yields abundantly. The fruit brings a good price, and the demand is constant and growing. The fruit is pickled green or ripe.

Oranges and lemons do well and bear abundantly. No attempts were made to plant them in quantity until within the past few years. There are in yards all over the county numberless trees that bear profusely. Several small orchards have been planted within the last few years, but they have not yet come into bearing. The trees are healthy and vigorous.

Almonds are being grown with success.

Raisin grapes, and indeed all grapes, grow remarkably well. The raisins can be cured in the sun during the long summer days.

An immense winery is located on the Stanford ranch, in the southern part of the county.

Peaches are the principal fruit. They are shipped green, and are canned and dried. The bulk of the crop is dried.

Prunes are readily cultivated and yield abundantly.

The apricot is the third fruit in importance. All the apricots are dried. The pits are sold for fuel, or for extracting the oil, which is used by druggists and confectioners.

Pears do well. The fruit is nearly all shipped green. The Bartlett is the favorite.

Figs are attracting more attention since the procurement of blastophaga, the insect which fertilizes the Smyrna fig. A great many of these trees are now being planted, and no doubt this fruit will assume a larger place in the output of the county hereafter.

Apples are grown only in the foothills. The chief apple-producing region of the county is at Manton, 35 miles to the northeast of Red Bluff, where very fine apples are raised.

Berries and all small fruits do well. They come into market early and sell readily.

In agriculture there has been a gradual change from the growing of wheat to fruit or other grains.

Hay is made from a mixture of wild oats and wheat grown together and cut when just on the point of turning. It is cured on the ground and then stacked.

Alfalfa, where water can be obtained, is the best of all forage crops. It is a splendid feed for cattle, hogs, and horses.

Experiments are being made looking toward the cultivation of hops and sugar beets.

The stock business is carried on under conditions that differ from those of the Eastern States, and are differing from those of former years here. The owner of cattle, sheep, and goats finds it necessary to

own or control two ranges; one in the valley for the winter months, and one in the mountains for the summer season. Considerable land has been withdrawn into temporary forest reserves. The number of men engaged in the stock business has greatly increased, and range land has been in greater demand as a consequence.

Sheep raising is easily the favorite branch of the stock business. This is the principal wool-producing county of Northern California, and indeed of the State. Twice each year the buyers come here, and there is a busy time until the wool is sold. It is sometimes bought before the sheep are sheared. The favorite breeds of sheep are Spanish Merino, French Merino, Southdown, and Cotswold for wool, and Shropshire more particularly for mutton.

The cattle business is conducted in much the same general way as the sheep business, except that the animals do not require constant care and herding; there is a further difference, that nearly every farmer has at least a few head of cattle, while but few of them have any sheep. The favorite breeds of cattle are Holstein, Hereford, Jersey, and Durham.

Of late years Angora goats have come into greater favor. They are hardy animals, readily adapting themselves to a mountainous and hilly country which no other animal can occupy. They will eat almost anything; can protect themselves from wild animals, and their wool or mohair is in demand and brings a good price.

There is everywhere plenty of timber of various kinds for fuel, posts, etc., for immediate local use. Oaks are the principal trees of the valley, except along the streams, where willows, cottonwoods, and sycamores abound. Oak wood is the favorite fuel. But in the Sierras there is a magnificent belt of timber containing a great preponderance of sugar pine, which is one of the finest of timber trees. Several sawmills are located in this timber belt, and most of the land, if not all, is now owned by private individuals or corporations.

The wool, lumber, stock, fruit, hay, grain, etc., can all be sold at Red Bluff. A market is always available in San Francisco; and in Red Bluff, the county seat, there are local individuals and firms ready and willing to buy all of these products that are offered. There are two large packing houses for fruit, warehouses for wool and grain, livery stables for hay, a flouring mill for wheat, and railroad and river means of transportation.

The large land holdings are being broken into smaller tracts to encourage immigration and settlement. The outlook is most hopeful.

STATISTICS OF TEHAMA COUNTY, 1908-9.

General Statistics.	
Area, 3,200 square miles, or 2,048,000 acres.	
Number of acres assessed	1,344,294
Value of country real estate	$6,710,405
Of improvements thereon	$971,710
Of city and town lots	$586,230
Of improvements thereon	$1,145,750
Of personal property	$2,214,875
Total value of all property	$11,628,970
Expended on roads, last fiscal year*	$50,000
Expended for bridges, last fiscal year*	$18,000
Number of miles of public roads	820
Road levy per $100, 1909	38c

General Statistics—Continued.	
Value of county buildings	$75,000
Irrigating ditches—miles, 340; cost	$68,000
Railroads, steam—miles, 57.83; assessed valued	$1,778,044
Electric power lines—miles, 101; assessed value	$52,050
Telegraph lines—miles, 116; assessed value	$12,795
Telephone lines—miles, 115; assessed value	$10,930

* Estimate.

STATISTICS OF TEHAMA COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	26,870	1,870	$56,100
Barley	35,850	3,799	94,975
Oats	2,800	603	21,075
Hops	100	97	19,400
Potatoes	175	408	10,200
Beans	120	57	2,565
Total cereals.	65,915	6,834	$204,315
Alfalfa hay		8,120	$48,720
Grain and grass hay	32,180	10,720	107,200
Total hay	32,180	18,840	$155,820

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	320,960	$6,419
Apricots	208,635	4,173
Asparagus	45,000	3,600
Blackberries	60,000	3,600
Beans, string	100,000	5,000
Beets	45,000	775
Cabbage	185,000	2,313
Celery	15,000	600
Cauliflower	32,000	3,200
Corn, sweet	190,000	4,000
Currants	5,000	500
Cherries	20,000	1,400
Fruit, assorted	2,132,410	42,648
Gooseberries	6,000	300
Grapes	18,057,341	361,147
Turnips	250,000	1,875
Melons	912,073	6,090
Lemons	12,000	300
Loganberries	8,000	600
Vegetables, assorted	135,290	5,200
Onions	40,000	1,250
Oranges, boxes	4,239	4,239
Olives, pickled	875,356	65,652
Pears	1,741,272	17,413
Peaches	236,398	5,328
Peas	90,000	6,300
Pumpkins	1,200,000	3,600
Plums	259,195	2,592
Irish potatoes	1,380,000	17,250
Sweet potatoes	213,114	2,131
Prunes	46,225	462
Peanuts	5,000	250
Raspberries	10,000	1,000
Strawberries	75,300	2,761
Tomatoes	2,000,000	32,000
Chi. cabbage	28,000	400
Chi. greens	40,000	400
Peppers	27,000	1,620
Total value		$618,388
Dried—	*Pounds.*	*Value.*
Almonds	176,000	$17,600
Apricots	93,249	6,527
Beans	34,500	690
Figs	75,000	1,500
Onions	140,000	2,450
Pears	471,100	23,555
Peaches	6,096,498	274,342
Peanuts	5,000	300
Prunes	2,362,013	82,670
Raisins	14,090	1,127
Walnuts	16,000	1,600
Fruit, assorted	3,162,346	173,929
Nuts, assorted	296,460	29,646
Totals	12,942,256	$615,936

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	18,550	3,750	22,300
Apricot	63,410	1,000	64,410
Cherry	4,910	245	5,155
Fig	10,625	2,535	13,160
Lemon	685	170	855
Olive	67,460	7,260	74,720
Orange	10,380	3,540	13,920
Peach	671,900	113,750	785,650
Pear	61,050	3,750	64,800
Plums	6,050	.....	6,050
Prune	110,025	7,820	117,845
Total fruit.	1,025,045	143,820	1,168,865
Almond	34,995	350	35,345
Walnut	3,500	.....	3,500
Total nut..	38,495	350	38,845
Grapevines, acres	2,775	.....	2,775
Berries, acres	60	.....	60

Poultry and Eggs.

	Dozen.	Value.
Live poultry, pounds	307,685	$34,615
Ducks, pounds	405,816	60,872
Eggs	318,820	95,646
Total value		$191,133

Live Stock Industry.

	Number.	Value.
Cattle—Beef	28	$840
Stock	24,350	304,385
Dairy cows	1,462	36,550
Thoroughbred	290	16,800
Swine	6,400	19,200
Horses—American	2,092	117,930
Standard-bred	12	4,650
Common	2,084	65,490
Colts	917	20,390
Jacks	18	2,995
Mules	990	63,835
Sheep	212,808	425,615
Bucks	1,927	9,635
Common goats	19,790	29,685
Thoroughbred bulls	44	2,700
Thoroughbred yearlings	73	1,515
Mule colts	340	11,005
Common bulls	40	1,220
Total stock all kinds	273,665	$1,134,440
Wool, pounds	2,999,019	$299,902
Mohair, pounds	109,628	17,540

Forest Products.

	Amount.	Value.
Fuel, wood, cords	13,020	$32,525
Lumber, feet	22,005,000	220,050
Pickets, pieces	5,000	75
Posts, pieces	24,100	3,013
Railroad ties, pieces	20,000	4,000
Sash and door factories, 1; product	.....	125,500
Shakes, thousand	561	6,171
Total value		$391,334

Number of sawmills, 2; planing mills, 1.

Power used for mills and manufactories in county—Steam, 3; electrical, 8; gasoline, 1.

STATISTICS OF TEHAMA COUNTY, 1908-9—Continued.

Fish Industry.

	Pounds.	Value.
Salmon	345,595	$24,192

Manufactories.

	No.	No. of Empl's.	Value of Product.
Wood boxes	1	30	$125,000
Brick	1	6	.....
Cigars	2	5	10,250
Carpets	1	5	17,500
Confectionery and ice cream	4	7	9,465
Flouring mills	1	5	75,000
Foundries and iron works	1	2	6,000
Furniture and picture frames	2	.....	7,250
Jewelry	1	1	5,000
Leather goods	3	6	11,000
Mineral waters	.....	.....	600
Meat products—			
Hides and pelts	.....	.....	19,256
Lard	.....	.....	6,000
Meat packed	.....	.....	35,000
Tallow	.....	.....	2,500
Olive oil	.....	.....	2,000
Pickled olives	1	.....	82,164
Ice	.....	.....	10,500
Salts, mineral	.....	.....	2,500
Syrups and extracts	.....	.....	1,250
Tamales	.....	.....	1,750
Medicine	.....	.....	3,000
Tin and galvanized iron	.....	.....	5,500
Scouring mills	.....	.....	15,000
Gas	.....	.....	8,500
Soda water	.....	.....	5,500
Cement blocks	.....	.....	2,200

Dairy Industry.

	No.	Production.	Value.
Creameries	2	.....	.....
Butter, pounds	.....	112,500	$30,938
Cream, gallons	.....	17,220	17,220
Milk, gallons	.....	248,565	74,570

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	460,000	$115,000
Brandy	20,000	40,000

Number of wineries, 2; distilleries, 1.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 300	12,890	$1,000
Broomcorn	26,000	1,040
Honey	.....	1,000
Hops	194,250	23,310
Syrup	.....	1,250
Sugar beets	600,000	2,400
Broomcorn seed	40,000	1,200
Cement blocks	.....	2,200
Alfalfa meal	.....	16,000
Peach pits, sacks	4,500	2,250
Nursery stock*	.....	20,000

* Estimate.

Manufactured Output.

	Quantity.
Cigars, thousand	165
Flour, barrels	15,000
Hides, pounds	192,560
Lard, pounds	60,000
Meat packed, pounds	500,000
Tallow, barrels	150
Olive oil, gallons	1,000

TRINITY COUNTY.

Trinity being in the northwestern part of the State, its general contour is mountainous, and is drained by the Trinity, Mad, Eel, and Van Duzen rivers and their tributaries. Along the valleys and among the mountains are many farms and stock ranches well watered and wooded.

The adaptability of the altitude, soil, and climate, together with ample rainfall, which averages about forty-two inches a year, and the facilities for irrigation, adapts Trinity for nearly all kinds of agricultural and horticultural products. Mining for gold has been the principal industry for fifty years. The La Grange, Union Hill, and numerous other extensive hydraulic placer mines have attracted attention and visitors from all over the mining sections of the world. Quartz, dredge, and drift mining have produced good results and new finds are being made every year. Trinity has a variety of minerals—gold, silver, platinum, copper, iron, coal, asbestos, molybdenum, chrome, iron, and quicksilver. Large areas of mineral land are comparatively unprospected, and hundreds of acres of auriferous gravel await exploitation and development.

Trinity has large bodies of the finest yellow pine, sugar pine, and fir timber in the State. This timber is now on the market and will soon be utilized.

The State has commenced to build a highway across the southern part of the county to connect Humboldt County with the Sacramento Valley. This highway will open up a large amount of undeveloped land and many new industries.

The United States Forest Service, in connection with the county, has started to build a wagon road down along the Trinity River to Humboldt County; this will open up large areas of mineral and timber land with the incidental industries.

The proposed electric railway, now about to be started from Humboldt County through the Mad River, Hyampom, and Hay Fork valleys to the head of the Sacramento Valley, will provide transportation facilities for a large scope of country with very valuable resources that at present is not easy of access.

Wagon roads extend into different sections of the county from Siskiyou, Shasta, Mendocino, Tehama, and Humboldt counties. The Weaverville Automobile Company, a local corporation, runs an automobile line from Weaverville to Redding, providing a pleasant and quick mode of travel into the county.

Trinity is out of debt and the assessment roll is growing larger every year with a corresponding decrease in the tax rate. With a high school at Weaverville, the county seat, and good schools in every section of the county educational facilities are equal to those of other counties.

The Forest Service has constructed telephone lines over a large part of the reserve and these in connection with a number of private lines afford telephone communication to nearly all parts of the county. The

future industries of the county in addition to mining will be lumbering, stock raising, farming, fruit raising, and dairying. Trinity has a large area of land adapted for fruit raising, and when proper transportation facilities are provided, this industry will grow very fast.

Game and fish abound in different sections of the county.

Many mineral springs have been found, the most prominent at present are known as the Mystic Springs on Browns Creek, about 25 miles from Weaverville. Capitalists have purchased these springs and intend to develop them into the finest health resort in the United States, as their qualities have been proven to be very valuable.

The climate of Trinity is temperate, and with its mountain scenery, offers to the tourist, prospector, and investor many and varied inducements.

STATISTICS OF TRINITY COUNTY, 1908-9.

General Statistics.

Area, 3,000 square miles, or 1,920,000 acres.	
Number of farms	326
Number of acres assessed	604,112
Value of country real estate	$2,207,591
Of improvements thereon	$251,975
Of city and town lots	$28,536
Of improvements thereon	$80,944
Of personal property	$327,663
Total value of all property	$2,881,330
Expended on roads, last fiscal year	$12,224
Expended for bridges, last fiscal year	$6,653
Number of miles of public roads	472
Number of miles of public trails	606
Road levy per $100, 1909	40c
Value of county buildings	$20,000
Irrigating ditches—miles, 215; cost	$21,500
Railroads, steam—miles, ¾; assessed value	$500
Electric light plants, assessed value	$2,250
Electric power plants—4; assessed value	$21,500
Electric power lines—miles, 35; assessed value	$7,450
Ice plant, 1	$1,000
Number of acres irrigated	9,320
Mining ditches—miles, 489; cost	$978,000
Gold mining claims—1710; assessed value	$1,550,774
Quicksilver mining claims—28; assessed value	$12,150
Copper mining claims—18; assessed value	$1,175

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	1,700	970	$38,800
Barley	80	40	1,600
Oats	200	80	3,200
Rye	45	25	1,000
Corn	260	195	7,800
Total cereals.	2,285	1,310	$52,400
Alfalfa hay	2,000	7,000	$105,000
Grain hay	5,200	6,500	110,500
Grass hay	6,500	9,750	162,350
Total hay	13,700	23,250	$377,850

Fruits, Vegetables, Etc.

Green—	*Total Production. Pounds.*	*Value.*
Apples	408,100	$8,162
Apricots	1,400	45
Asparagus	1,000	50
Blackberries	32,000	2,560
Beans	16,000	480
Beets	50,000	1,000
Cabbage	111,000	2,200
Celery	1,500	75
Cauliflower	3,000	90
Corn	100,000	2,000
Cherries	16,500	990
Figs	1,350	67
Grapes	97,000	1,355
Loganberries	.....	650
Onions	56,500	1,130
Pears	72,000	1,440
Peaches	81,000	2,025
Peas	8,000	320
Plums	36,000	720
Irish potatoes	582,000	11,640
Sweet potatoes	2,000	60
Prunes	36,500	730
Quinces	.....	750
Raspberries	.....	2,500
Strawberries	.....	13,800
Tomatoes	.....	14,500
Totals	1,712,850	$59,339

Dried—	*Pounds.*	*Value.*
Apples	8,000	$560
Almonds	.....	150
Beans	25,000	750
Onions	20,000	500
Pears	2,000	140
Peaches	5,000	350
Plums	2,000	100
Prunes	1,500	45
Walnuts	.....	500
Totals	63,500	$3,095

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	1,050	$4,200
Ducks	20	100
Geese	5	40
Turkeys	90	1,620
Eggs	100,000	20,000
Total value		$25,960

STATISTICS OF TRINITY COUNTY, 1908-9.—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	5,300	1,700	7,000
Apricot	40	10	50
Cherry	565	35	600
Fig	27	13	40
Lemon	15	10	25
Nectarine	14	.....	14
Olive	5	27	32
Orange	7	13	20
Peach	1,350	75	1,425
Pear	720	30	750
Plum	600	.....	600
Prune	726	43	769
Quince	122	37	159
Other kinds	60	.....	60
Total fruit trees.	9,551	1,993	11,544
Almond	25	.....	25
Chestnut	45	15	60
Pecan	5	.....	5
Walnut	187	42	229
Other nuts	.....	7	7
Total nut trees..	262	64	326
Grapevines, acres.	.....	.....	35
Blackberries, acr.	.....	.....	30
Currants, acres ..	.....	.....	2
Gooseberries, acr..	.....	.....	3
Raspberries, acres	.....	.....	25
Strawberries, acr.	.....	.....	50

Wines, Brandies, Etc.

	Gallons.	Value.
Beer, barrels	136	$816
Cider	2,000	1,000
Vinegar	5,000	1,500

Number of breweries, 1.

Miscellaneous Products.

	Value.
Bees, hives, 51	$102

Live Stock Industry.

	Number.	Value.
Cattle—Beef	820	$20,400
Stock	13,125	157,500
Dairy cows—Graded	475	10,925
Thoroughbred	50	5,000
Calves	2,600	13,000
Swine	2,500	7,500
Horses—		
Thoroughbred	5	1,250
American	200	10,000
Common	1,860	47,360
Colts	280	3,540
Jacks and jennies	24	615
Mules	235	6,580
Sheep	3,320	9,960
Lambs	1,200	1,200
Common goats	359	731
Total stock all kinds..	27,053	$295,561

Dairy Industry.

	Production.	Value.
Butter, pounds	82,000	$24,600

Forest Products.

	Amount.	Value.
Area of timber lands, acres	1,106,880	$5,475,200
Cedar, acres	5,000	.....
Pine, acres	400,000	.....
Fir, acres	701,880	.....
Sawmills, number	18	22,850
Fuel, wood, cords	22,350	89,400
Lumber, feet	3,656,000	73,120
Pickets, pieces	2,700	95
Posts, pieces	1,000	100
Shakes	22,000	220
Lagging	200,000	10,000
Mine timbers	250,000	7,500
Total value		$5,678,485

Power used for mills and manufactories in county—Steam sawmills, 8; water sawmills, 10; steam quartzmills, 5; water quartzmills, 26; electrical quartzmills, 3.

TULARE COUNTY.

Tulare County, out of which three or four valley counties have been carved, is still one of the largest. It is about the size of Connecticut, and is almost square. It is remarkable for the height and beauty of its mountains, for its enormous groves of giant sequoia, for the fertility of its soils, for the abundance of water courses, for the variety of products, for scenery that many declare to be superior to the Yosemite, for the highest mountain (Mount Whitney) in the United States on its eastern border, for the successful citrus territory, where are grown oranges that equal the finest produced, and for being the earliest section to be settled up and devoted to agricultural purposes. It is one of the greatest stock-raising counties. Cattle are raised for meat rather than for dairying, although the latter industry is keeping pace. The glory of Tulare is its deciduous fruit orchards, all along the channels of the Kaweah and Tule rivers. The soil is a deep alluvial loam, rich in nitrates and potash, and free from alkali.

Late frosts are rare. The spring is warm and early, which gives the fruit a perfect richness and sweetness.

While irrigation is general, at least to the extent of giving the trees one good drenching a year, there are many ranches where the underflow is only 6 to 12 feet from the surface, rising even higher in spring, and therefore no artificial watering is needed.

The principal town and the county seat is Visalia. It is the oldest city in the valley, having been founded in 1852 by the brothers Vice, for whom it was named. It is a modern, well-improved, prosperous city, with every prospect of continuous active growth. In the old days it was the starting point of the overland stage, and to-day it is said of Visalia that it represents more per capita wealth than any other city of like population. Visalia is midway between San Francisco and Los Angeles, but it was not until 1897 that it was connected with the main lines of the railroad. Electric power is supplied from a mountain water course.

Tulare City is the second in point of size; it is about 10 miles south of Visalia. The main line of the Southern Pacific and the Tulare-Visalia line of the Santa Fe pass through the city. In the surrounding country, cattle, hogs, and horses are raised, and there are flourishing orchards and broad wheat and alfalfa fields. It has substantial brick buildings, on broad, beautiful streets.

The famed citrus belt of Tulare lies about 12 miles east of Visalia, and includes a series of settlements, or districts, chief of which are Lindsay, Exeter, and Porterville. This land is practically frostless. The soil is known to contain in exact proportions the elements needed for the growth of citrus trees. Freedom from fog gives immunity from insect pests, which need moisture in the air to prosper. The long, warm summer brings the fruit to maturity earlier than is the case farther south, and as a result Tulare fruit reaches the Eastern market in

November and the first weeks of December, in time for the Christmas trade.

Most of the district has a plentiful supply of water in the form of an underflow—a natural reservoir at a depth of from 50 to 75 feet. It is raised by pumping. Formerly the pumps were operated by gasoline, but electricity is now available at a reasonable price. Farmhouses are lighted by electricity, and the cities of Visalia and Tulare and the towns of Exeter, Lindsay, and Porterville are supplied from the same plant.

The Porterville oranges have repeatedly carried off first prize in the citrus fairs of the State.

In the Alta district, in the northwestern part, a considerable acreage is devoted to raisins, which do well in this county, although their cultivation has not been attempted on so extensive a scale as elsewhere.

Situated midway between the cities of Los Angeles and San Francisco, the dairyman is enabled to take advantage of varying market conditions to secure the highest prices. There has been a marked increase in the dairy interests. Another noticeable gain was made in horses and mules. There is a growing demand for draft horses and large-boned, big-muscled mules, and these animals command good prices.

Soil and climate are generally adapted to diverse products. A crop of grain hay may be cut in May, and a harvest of potatoes, squashes, Indian or Egyptian corn taken from the same field in October. Alfalfa is one of the best honey plants. It supplies poultry with green feed the entire year. Its succulent shoots promote the rapid growth of young pigs and calves. The problem of meeting bills does not confront the diversified farmer. He has always something to sell. There is no waste. The hog gets what the reaper overlooks. The chicken in turn finds what the pig misses. A vast saving in labor is effected. With the aid of his family, daily tasks, trivial in themselves, accumulate in results that materially swell the income. Nor is there either drudgery or monotony on a farm of this kind. Varied interests and changing occupations give zest to life and rob labor of its burdens.

Alfalfa hay has a broad market for shipment. Squashes, onions, and beans command good prices. Honey has an unlimited market, it being shipped East in car load lots. Poultry and eggs are higher than in the East, and their production cheaper. Berries of all kinds thrive, and meet with a ready demand in the local market.

VENTURA COUNTY.

The county of Ventura lies on the Pacific coast of California, 300 miles in a southerly direction from San Francisco, and immediately adjoining the county of Los Angeles on the north and west. It has 50 miles of sea frontage on the shores of the Santa Barbara Channel, and along its frontage are found the best bathing beaches in the State. It embraces within its area every variety of soil found in the State, and its products are as varied as the soil. The climate is essentially semi-tropical, although snow falls in winter on the high mountains in the extreme northern part of the county. The breath of the frost does not reach the valleys. The melting snows supply the rivers that run down clear from the high hills to feed the streams that furnish pure mountain water for drinking, and for the irrigation of the orchards.

Along the stretches of the seashore and in the mountain valleys the climate is the most equable in the world. Figures of temperature really tell little, although the figures in Ventura will compare favorably with those from anywhere in the world. The winter range along the coast is from 40 to 70 degrees. The summer range is from 50 to 90 degrees. In the valleys, sheltered by the mountains, the records show a little colder in winter, a little warmer in summer. It is the smooth, soft feel of the air that counts, the high fogs of spring and summer that temper the heat of the sun, the bracing winds of winter that bring warmth to the land from the sea.

There are, in the fall of the year, a few days or weeks that the dwellers in the country call cold. An open fire is desirable, and indeed needful for comfort in the family evenings in the living room. But there is nothing that in any way parallels the bitter, biting cold of fall and winter in the East. Nobody thinks of fires in bedrooms in ordinary homes. The residence that has in it any provision for heating, aside from the family cooking stove and the open fireplace in the living room, is the exception. And, while wood is high in cost, a cord of fireplace chunks will carry any family of ordinary economical turn through the winter. Live oak wood costs ten dollar per cord.

Even in the valleys where the heat reaches its extreme in the summer months, there is so little humidity that the heat is easily endurable. It is even pleasant. For those weakened by disease, it is healing. There is, popularly speaking, a rainy season and a dry season. Actually, there is a part of the year when rain is to be expected, and a part when it is not to be. Rain may fall in September, and in any of the ensuing months then until the last of May. It always does fall in the real winter and spring months. But, withal, there is an average of three hundred days in the year when the sun shines. And in the summer it does not rain at all.

Many crops, nevertheless, are raised successfully without irrigation. There are other crops that must be irrigated, and oranges, lemons, and walnuts, of course, are among these. All orchards are better for irri-

gation. Fortunately, Ventura is one of the best watered counties in California, and irrigation systems now practically cover it. These irrigating systems have been developed within the last fifteen years, and their development still goes on. Within twenty years, at the outside, all the available farming lands in the county will be under the ditches.

The land of the county faces the sea to the south. Running down from mountain ranges that reach an extreme altitude of ten thousand feet in the northern portion, the lands of the county actually lie as the drainage basins of two water systems, the valleys of the Santa Clara and San Buenaventura rivers and their tributaries. These two streams, flowing the year around, have brought down from the mountains the silt that has made the rich soil of their valleys. It is possible, from their fall, to bring water from them to irrigate every inch of the farm lands.

The county of Ventura is not a new community in the sense that so much of the West is new. It has a population of more than twenty thousand. Its industries are developing—but they are likewise developed. It produces, in the wide range of its fertile soils, oranges and lemons, walnuts and olives, apricots and peaches, apples and berries, sugar beets and lima beans, hay and grain and honey and all the vegetables. The palm and the fern tree grow beside the apple and the pear. The lima bean product reaches the enormous annual total of 8,000,000 pounds, and there are grown every year 156,000 tons of sugar beets. The lemon crop brings in close to $600,000 annually, and the orange crop $135,000. More than three million of pounds of English walnuts, worth nearly $400,000, come yearly from its orchards. That shows a community with developed resources of wealth. The question from this time forth is of further development.

The county of Ventura has schools and churches, with the moral power of those agencies in other American communities. It is a distinctively American community, in its practices and its polity. It is a "dry" county, under the California law by the will of the people, saloons being given license only in incorporated towns. And most of the towns are dry. There are forty-eight school districts in the county, including those in the incorporated towns, and the schoolhouses are a credit to the taste and care of the people of the several districts. School is held in most districts ten months in the year. There are four Union high schools, in Ventura, Santa Paula, Oxnard, and Fillmore, their graduates accredited to the universities and the State normal schools. The local schools are of the highest class, and the qualifications for teachers most rigorous.

STATISTICS OF VENTURA COUNTY, 1908-9.

General Statistics.		General Statistics—Continued.	
Area, 1,852.66 square miles, or 1,185,704.95 acres.		Expended for bridges, last fiscal year	$14,982
Number of acres assessed	594,595	Number of miles of public roads	656
Value of country real estate	$13,417,348	Value of county buildings	$140,000
Of improvements thereon	$1,407,110	Irrigating ditches—miles, 59½; cost	$213,200
Of city and town lots	$1,640,660	Railroads, steam — miles, 108.32; assessed value	$2,522,522
Of improvements thereon	$1,404,730	Electric power plants, assessed value	$87,672
Of personal property	$4,318,872	Number of acres irrigated	11,000
Total value of all property	$22,188,720		
Expended on roads, last fiscal year	$75,578		
Road levy per $100, 1909	40c		

STATISTICS OF VENTURA COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	3,100	1,520	$56,510
Barley	11,200	4,675	121,485
Oats	1,865	504	21,160
Corn	1,840	850	30,600
Total cereals.	18,005	7,549	$229,755
Alfalfa hay	.....	2,700	$29,700
Grain hay	.....	14,600	175,200
Total hay	.....	17,300	$204,900

Fruits, Vegetables, Etc.

	Total Production. Pounds.	Value.
Green—		
Apples	427,000	$6,405
Apricots	36,000	1,800
Asparagus	3,000	300
Blackberries	50,000	1,250
Beans	4,500	225
Beets	4,500	225
Cabbage	150,000	1,500
Celery	2,000	100
Cauliflower	5,000	250
Corn	28,000	1,400
Cherries	165,000	9,900
Figs	6,000	300
Grapes	140,000	8,400
Grape fruit	36,000	1,800
Lemons, boxes	235,200	823,200
Loganberries	12,000	240
Nectarines	4,500	225
Oranges, boxes	160,000	160,000
Olives	440,000	132,000
Pears	84,000	2,520
Peaches	110,000	3,300
Peas	7,500	375
Persimmons	6,000	360
Plums	8,000	400
Irish potatoes	1,280,000	25,600
Sweet potatoes	68,000	1,360
Prunes	7,000	280
Quinces	4,000	160
Raspberries	17,200	1,000
Strawberries	120,000	6,000
Tomatoes	120,000	1,200
Pomegranates	30,000	3,000
Total value		$1,195,075
Dried—	Pounds.	Value.
Almonds	116,000	$13,900
Apricots	6,800,000	544,000
Beans, Lima	70,400,000	2,650,000
Onions	192,000	11,520
Peaches	1,000	100
Prunes	320,000	10,600
Walnuts	3,126,000	375,120
Small beans	6,240,000	249,600
Total value		$3,854,840
Canned—	Cases.	Value.
Tomatoes	150	$400

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	50,000	$15,000

Number of wineries, 7; distilleries, 1.

Dairy Industry.

	No.	Production.	Value.
Creameries	2	.....	.....
Skimming station.	1	.....	.....
Butter, pounds	..	108,000	$37,800

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	12,500	1,100	13,600
Apricot	86,000	3,800	89,800
Cherry	1,800	600	2,400
Fig	1,800	700	2,500
Lemon	108,000	40,000	148,000
Nectarine	600	300	900
Olive	38,000	5,000	43,000
Orange	104,600	12,000	116,600
Peach	6,800	1,200	8,000
Pear	3,200	700	3,900
Plum	1,800	500	2 300
Prune	19,000	3,000	22,000
Quince	800	100	900
Other kinds	6,000	6,000	12,000
Total fruit trees.	390,900	75,000	465,900
Almond	12,000	2,000	14,000
Walnut	129,830	42,800	172,620
Total nut trees.	141,830	44,800	186,630
Grapevines	112,000	18,000	140,000
Berries, acres	280	130	410

Fish Industry.

	Pounds.	Value.
All kinds	1,164,000	$40,740

Live Stock Industry.

	Number.	Value.
Cattle—Beef	4,500	$180,000
Stock	20,000	400,000
Dairy cows—Graded	1,200	36,000
Thoroughbred—		
Herefords	180	18,000
Jersey	500	50,000
Polled Angus	150	15,000
Calves	4,200	42,000
Swine	7,200	21,600
Horses—		
Common	8,200	1,066,000
Colts	1,500	37,500
Jacks and jennies	15	15,000
Mules	1,750	17,500
Sheep	18,450	92,250
Lambs	9,200	27,600
Angora goats	1,500	6,000
Common goats	1,200	2,500
Total stock all kinds.	79,745	$2,026,950
Wool, pounds	180,000	$10,800
Mohair, pounds	3,000	1,200

Poultry and Eggs.

	Dozen.	Value.
Chickens	4,700	$23,500
Turkeys	230	6,900
Eggs	280,000	70,000
Total value		$100,400

Forest Products.

	Amount.	Value.
Area of timber lands. acres	50,000	.....
Pine, acres	50,000	.....
Sawmills, number	2	$12,000
Charcoal, sacks	9,000	4,500
Fuel, wood, cords	8,000	80,000
Lumber, feet	600,000	15,000

Power used for mills and manufactories in county—Steam, 12; water, 1; electrical, 18.

STATISTICS OF VENTURA COUNTY, 1908-9—Continued.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 12,080	....	$48,320
Beeswax	5,400	1,296
Flowers and plants, acres	80	24,000
Honey	880,000	52,800
Garden seed and bulbs	3,800	9,500
Sugar beets, tons	235,000	1,175,000
Mineral production—		
Natural gas, cu. ft., M	3,625	4,530
Petroleum, barrels	296,000	296,000
Rubble, tons	18,800	9,000
Clay, tons	560	1,680
Macadam, tons	17,500	6,400

Manufactories.

	No.	No. of Empl's.	Value of Product.
Bookbinderies	1	2	$1,800
Brick	2	19	12,000
Cigars	1	2	2,000
Confectionery	4	11	15,000
Foundries and iron works	2	38	68,000
Meat products—			
Hides	....	....	30,000
Lard	....	....	25,000
Meat packed	....	....	4,500
Tallow	....	....	800
Planing mills	4	28	35,000
Artificial stone	3	7	4,000
Sugar, beet	1	650	2,000,000
Tiling	1	4	6,000

Manufactured Output.

	Quantity.
Brick	1,200,000
Hides, pounds	320,000
Lard, pounds	175,000
Meat packed, pounds	25,000
Tallow, barrels	350

YOLO COUNTY.

Yolo County is acknowledged by those at all acquainted with its wonderful fertility to be the gem of the great Sacramento Valley. Approaching it from the north or from the south, one is impressed with the increasing richness of the soil.

About four fifths of its area is level, but the western portion breaks into hills, with canyons and valleys of considerable extent, chief among which is Capay Valley, noted as one of the earliest fruit sections of the State. The hills are nearly all used for grazing, except the numerous homesteads. Along the eastern side of the county, near the Sacramento River, is what is known as the "tule basin," which contains about 40,000 acres. These lands are overflowed during high water, but as the water recedes furnish rich pasture for immense herds of stock. The county has very little waste land.

The two principal streams are Putah Creek and Cache Creek, the former being the boundary line, for a portion of the way, between Solano and Yolo counties. Cache Creek is the outlet of Clear Lake. Its elevation is 1,300 feet above sea level, and with Cache Creek as its only outlet, it will be seen that nature has furnished a magnificent natural reservoir. It is estimated that 50,000 horsepower could be generated by its waters, and that there would be enough left to irrigate every acre of land on each side of the creek after it reaches the valley.

During high water Cache Creek has brought down from the hills and mountains immense quantities of the very cream of the soil, and for ages has been depositing this upon the land. The result is that there is a rich sedimentary deposit of from 20 to 30 feet in depth, entirely without hardpan, which is as rich as the valley of the Nile. This is particularly true of a large area around Woodland. It is ideal fruit land. You may find growing on this soil wheat, barley, oats, corn, alfalfa, all the vegetables of a temperate and sub-tropical climate, apples, apricots, nectarines, plums, pears, peaches, prunes, oranges, lemons, limes, figs, pomegranates, grapes (table, wine, and raisin), olives, almonds, walnuts, berries, and melons. Some of these lands are better adapted to particular crops than others, yet there are eighty-acre tracts of this sedimentary soil in the valley on which everything that has been named is now produced. The foothills in the western part, from Winters to Capay, and north, as well as those bordering Capay Valley, are mostly very fertile, and a great many have planted orchards and vineyards, the warm soil and exemption from frost making it a very desirable location.

The products are varied. Until within a few years, the cultivated area was devoted almost entirely to the production of wheat and to stock raising. Yolo still holds the banner as the largest producer of wheat and barley, according to acreage, but in the mean time she is coming to the front as a fruit producer.

The grape industry is a very important item. Yolo has the honor of producing the first raisins of commerce in America, and the late R. B. Blowers was the pioneer grower. The Seedless Sultana grape, which is grown here quite extensively, makes a very plump and "meaty" raisin,

and for years the Woodland Sultanas have been acknowledged by the trade to be the best in the State. The shipment of table grapes to the New York market is quite an industry.

This county is noted for producing some of the fastest horses in California, and any day, on the streets and roads, can be seen fine specimens of driving horses. Woodland has been a center from which thousands of horses and mules have been shipped during the past few years, and they have gone to all parts of the country, notably to Hawaii, the Philippines, South Africa, and the Southern States.

There are thousands of acres of alfalfa, and the area is rapidly increasing. As each acre will yield from six to eight tons of hay, it can readily be seen how important the dairy interests may become. For stock of any kind there can be no better feed than alfalfa, either green or cured for hay.

The county seat is Woodland. Its streets are wide and clean, and lined with shade trees, while here and there can still be seen some of the majestic old oaks which suggested the name of the city.

Winters is located on Putah Creek, in the southwestern part of the county, and is noted as the earliest fruit section in the State.

Davis, also located on Putah Creek, is in a very fertile section. There are probably more almonds grown here than in any other district in the State.

Yolo is on Cache Creek. It is also in a very fine fruit section, and boasts of having the largest almond orchard in the world. It has an olive-oil and pickling plant. The olives used for oil are first dried, and then run through a mill, which separates the seed from the pulp, the latter being then pressed to extract the oil. It is claimed that this process gives an oil of superior flavor, and is the only mill in existence which uses this process. The olives, after being dried, can be stored away and will keep in that condition for an indefinite time, thus giving the mill the entire year in which to work up the product.

Esparto is near the mouth of Capay Valley, on Cache Creek. It is surrounded by a fine body of land, largely devoted to fruit, vines, and alfalfa. It is quite a shipping point for wheat and barley.

The Woodland Chamber of Commerce, the Winters Board of Trade, and the Guinda Board of Trade are active public organizations.

The legislature of 1905 made an appropriation of $150,000 for the purchase and equipment of a university farm and to provide instruction in agriculture in connection therewith. This farm has been located upon a tract of about 780 acres of first-class valley land contiguous to the town of Davis. The legislature of 1907 appropriated $132,000 for additional buildings, equipment, etc.

STATISTICS OF YOLO COUNTY, 1908-9.

General Statistics.	
Area, 1,017 square miles, or 650,880 acres.	
Number of acres assessed	596,231
Value of country real estate	$12,452,808
Of improvements thereon	$1,354,631
Of city and town lots	$1,005,119
Of improvements thereon	$1,701,252
Of personal property	$2,257,336
Total value of all property	$18,976,643
Expended on roads, last fiscal year	$68,134
Expended for bridges, last fiscal year	$32,000
Road levy per $100, 1909	40c

Manufactories—Continued.	
Number of miles of public roads	685
Value of county buildings	$60,000
Irrigating ditches—miles, 425; cost	$120,000
Railroads, steam—miles, 87.80; assessed value	$2,046,238
Electric power lines—miles, 72; assessed value	$83,458
Number of acres irrigated	10,700
Telegraph and telephone lines, 3; assessed value	$61,622

STATISTICS OF YOLO COUNTY, 1908-9—Continued.

Fruits, Vegetables, Etc.

	Total Production.	
Green—	*Pounds.*	*Value.*
Apples	30,000	$600
Apricots	4,250,000	30,500
Asparagus	40,000	3,000
Blackberries	1,500	100
Beans	3,000,000	90,000
Beets	12,000	1,200
Cabbage	1,051,000	10,000
Celery	126,000	2,400
Cauliflower	30,000	6,000
Corn	200,000	4,000
Cherries	2,000	100
Figs	15,000	450
Grapes	2,250,000	98,000
Grape fruit	2,500	50
Lemons, boxes, 50	.....	200
Loganberries	42,000	4,200
Nectarines	6,000	400
Onions	37,000	740
Oranges, boxes, 2,500	.....	3,750
Olives	60,000	2,400
Pears	1,280,000	51,200
Peaches	3,990,200	79,804
Peas	27,000	810
Persimmons	4,000	80
Plums	1,400,000	42,000
Irish potatoes	1,000,000	12,500
Sweet potatoes	40,000	800
Prunes	28,000	560
Quinces	3,000	250
Raspberries	4,000	600
Strawberries	6,000	600
Tomatoes	1,728,300	17,283
Wine grapes	20,000,000	50,000
Totals	36,466,500	$514,577
Dried—	*Pounds.*	*Value.*
Almonds	1,680,000	$201,600
Apricots	500,000	42,500
Beans	3,000,000	90,000
Figs	130,000	3,250
Nectarines	2,500	125
Onions	1,500,000	30,000
Peaches	1,000,000	50,000
Prunes	2,600,000	52,000
Raisins	2,000,000	40,000
Walnuts	20,000	2,000
Cantaloupes	.....	10,000
Melons	.....	2,000
Totals	12,432,500	$523,475
Canned—	*Cases.*	*Value.*
Apricots	7,000	$14,000
Peaches	26,000	52,000
Totals	33,000	$66,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	*Tons.*	*Value.*
Wheat	7,910	4,746	$132,380
Barley	65,000	39,000	975,000
Oats	200	100	2,500
Corn	3,000	1,500	37,500
Total cereals	76,110	45,346	$1,147,380
Alfalfa hay	9,085	36,340	$363,400
Grain hay	20,000	16,000	192,000
Total hay	29,085	52,340	$555,400

Fish Industry.

	Pounds.	*Value.*
Salmon	2,610,920	$169,709
Other kinds	574,255	40,197
Totals	3,185,175	$209,906

Number of Fruit Trees and Vines.

	Bearing.	*Non-Bearing.*	*Total.*
Apple	850	120	970
Apricot	83,000	1,000	84,000
Cherry	5,000	75	5,075
Fig	5,500	900	6,400
Lemon	1,500	200	1,700
Nectarine	300	25	325
Olive	22,000	4,000	26,000
Orange	13,000	875	13,875
Peach	70,000	6,700	76,700
Pear	22,000	.....	22,000
Plum	3,000	.....	3,000
Prune	135,000	.....	135,000
Quince	2,000	.....	2,000
Other kinds	17,000	.....	17,000
Total fruit trees	380,150	13,895	394,045
Almond	123,000	11,000	134,000
Pecan	300	.....	300
Walnut	8,000	900	8,900
Other nuts	1,500	.....	1,500
Total nut trees	132,800	11,900	144,700

Grapevines (all kinds, bearing, 2,675,000 (5,575 acres); non-bearing, 50,000 (144 acres); total, 2,725,000 (5,679 acres).

Berries (all kinds), acres, 10.

Fruit and nut trees planted, season of 1909: Peach, 20,000; almond, 20,000.

Live Stock Industry.

	Number.	*Value.*
Cattle—Beef	797	$17,325
Stock	9,674	96,740
Dairy cows—Graded	5,000	150,400
Thoroughbred—		
Ayrshire	20	1,000
Herefords	40	1,000
Holsteins	240	20,000
Jersey	300	10,000
Shorthorns	250	18,750
Swine	10,000	38,740
Horses—		
Thoroughbred	100	7,500
Standard-bred	300	30,000
Common	4,000	200,000
Colts	2,200	26,375
Jacks and jennies	39	3,950
Mules	1,500	150,000
Sheep	5,500	192,500
Angora goats	50	200
Common goats	1,000	3,000
Total stock all kinds	90,460	$967,480
Wool, pounds	495,000	$84,150
Mohair, pounds	9,000	2,250

Forest Products.

	Amount.	*Value.*
Eucalyptus, acres	320	$32,000
Fuel, wood, cords	6,100	24,400
Total value		$56,400

Power used for mills and manufactories in county—Steam, 20; electrical, 5; gasoline, 12; total, 37.

Poultry and Eggs.

	Dozen.	*Value.*
Chickens	21,000	$105,000
Ducks	500	2,000
Geese	50	450
Turkeys	2,000	60,000
Eggs	300,000	60,000
Total value		$227,450

STATISTICS OF YOLO COUNTY, 1908-9—Continued.

Dairy Industry.

	No.	Production.	Value.
Creameries	2	.....	.....
Butter, pounds		1,073,479	$313,543
Cheese, pounds		182,500	31,025
Ranch butter		8,000	1,600
Totals		1,263,979	$346,168

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	154,700	$21,005
Beer, barrels, 2,221	66,610	13,322
Brandy	28,000	14,000
Vinegar	12,000	1,200

Number of wineries, 1; distilleries, 1; breweries in operation, 1.

Miscellaneous Products.

	Pounds.	Value.
Bees, hives, 4,725	.....	$14,175
Beeswax	5,200	1,300
Honey	300,000	24,000
Hops	680,000	136,000
Alfalfa seed	200,000	30,000
Garden seed	12,000	3,800
Sugar beets, tons	50,000	250,000
Wild mustard	40,000	4,000

Manufactories.

	No.	No. of Empl's.	Value of Product.
Cigars	1	3	$5,000
Confectionery	3	6	50,000
Flouring mill	1	15	160,000
Foundry and iron works	1	5	20,000
Furniture	4	8	10,000
Leather goods, harness	6	10	28,650
Machinery	1	20	100,000
Meat products—			
Hides		....	20,000
Lard		....	13,500
Meat packed		....	5,000
Tallow		....	6,000
Olive oil		....	200
Pickled olives		....	3,790
Pickles		....	1,000
Planing mills	4	15	40,000
Miscellaneous	5	15	50,000

Manufactured Output.

	Quantity.
Cigars	185,000
Flour, barrels	25,000
Hides, pounds	200,000
Tallow, barrels	300
Olive oil, gallons	60
Pickles, gallons	2,000

YUBA COUNTY.

Yuba County is about half valley and half mountains. In the mountainous portion the industries are mining, lumbering, and stock raising, but considerable fruit and hay are produced. At Hammonton and Marigold, on the Yuba River, dredge mining is carried on extensively. The machines are in operation day and night.

The Colgate power plant derives its energies from the waters of the Yuba River. It has the longest transmission line in the State.

Many important quartz mines are operated.

The Feather River forms most of the western boundary. This stream is the second largest water course in the Sacramento Valley, and is navigable as far up as Marysville.

Bear River is the southern boundary of the county. The Yuba River passes through the county about midway. These rivers are never failing in water supply. Subterranean water is available in most parts of the county. There are two irrigation districts that take the water from the Yuba River.

The county is traversed by two lines of the Southern Pacific, by the Western Pacific, and by the Northern Electric railroads. The California Midland Railroad has obtained rights of way and will be built.

The county has at Wheatland the largest hop fields in the world. In the production of gold it ranks fourth among the counties of the State.

Marysville is well represented by manufacturing establishments. A woolen mill, a wool scouring plant, a flour mill, a cannery, a fruit packing house, a brick and cement block manufactory, a creamery, three foundries and machine shops, and other productive plants. Electric power is abundant, and shipping facilities are abundant and cheap. There is a ready market for all the manufactured product.

Land is very reasonable in price and very productive. Much of the desirable area of the county is practically undeveloped. The valley lands will successfully produce anything that can be grown from Maine to Florida.

STATISTICS OF YUBA COUNTY, 1908-9.

General Statistics.	
Area, 625 square miles, or 400,000 acres.	
Number of farms	900
Number of acres assessed	366,049
Value of country real estate	$2,461,595
Of improvements thereon	$534,905
Of city and town lots	$727,050
Of improvements thereon	$1,109,610
Of personal property	$1,507,995
Total value of all property	$6,496,285
Expended on roads, last fiscal year	$23,479
Expended for bridges, last fiscal year	$40,082
Number of miles of public roads	450
Road levy per $100, 1909	40c
Value of county buildings	$200,000
Irrigating ditches—miles, 100; cost	$160,550

General Statistics—Continued.	
Railroads, steam—miles, 45; assessed value	$800,000
Railroads, electric—miles, 14; assessed value	$67,500
Electric power plant—1; assessed value	$94,000
Electric power lines—miles, 163; assessed value	$108,000
Number of acres irrigated	6,000
Telegraph lines, 72 miles	$5,400
Telephone lines, 3,000 miles	$35,000

Wines, Brandies, Etc.		
	Amount.	*Value.*
Beer, barrels	2,250	$11,250
Number of breweries, 1.		

STATISTICS OF YUBA COUNTY, 1908-9—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	15,000	5,400	$189,000
Barley	4,700	2,844	73,944
Oats	5,500	1,320	38,250
Corn	75	350	10,500
Total cereals.	25,275	9,914	$311,694
Alfalfa hay	550	2,750	$27,500
Grain hay	10,450	13,060	143,660
Total hay	11,000	15,810	$171,160

Number of Fruit Trees and Vines.

	Bearing.	Non-Bearing.	Total.
Apple	7,200	1,000	8,200
Apricot	12,000	3,500	15,500
Cherry	10,000	4,000	14,000
Fig	5,000	2,500	7,500
Lemon	4,000	2,500	6,500
Olive	9,500	1,000	10,500
Orange	35,000	26,000	61,000
Peach	70,000	22,000	92,000
Pear	16,000	2,000	18,000
Prune	6,000	2,800	8,800
Quince	100	.....	100
Total fruit trees.	174,800	67,300	242,100
Almond	6,500	1,200	7,700
Walnut	2,800	400	3,200
Total nut trees..	9,300	1,600	10,900
Grapevines	200,000	.....	200,000
Berries, acres	200	.....	200

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	52,000	$780
Apricots	21,000	420
Celery	4,500	125
Cauliflower	6,200	225
Grapes	8,000,000	40,000
Lemons, boxes	75	150
Oranges, boxes	600	1,200
Pears	2,000,000	40,000
Peaches	2,000,000	20,000
Peas	5,000	150
Plums	800,000	8,000
Quinces	20,000	200
Tomatoes	400,000	4,000
Cucumbers	500,000	5,000
Total value		$120,250

Dried—	Pounds.	Value.
Almonds	59,000	$5,900
Apples	1,250	87
Apricots	22,000	2,200
Currants	11,000	1,045
Figs	100,000	2,500
Pears	118,000	8,260
Peaches	275,000	11,000
Plums	8,500	340
Prunes	125,000	3,750
Raisins	130,000	5,200
Totals	849,750	$40,282

Canned—	Cases.	Value.
Peaches	50,000	$175,000
Plums	3,500	8,750
Totals	53,500	$183,750

Dairy Industry.

	No.	Production.	Value.
Creamery	1	.....	.....
Butter, pounds		145,000	$40,600

Live Stock Industry.

	Number.	Value.
Cattle—Beef	4,000	$140,000
Stock	5,000	90,000
Calves	2,500	$25,000
Swine	6,000	72,000
Horses—		
Thoroughbred	30	6,000
Standard-bred	20	20,000
Common	4,500	337,500
Colts	700	17,500
Jacks and jennies	25	1,000
Mules	.....	62,500
Sheep	50,000	150,000
Common goats	650	1,625
Wool, pounds	400,000	72,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	7,500	$37,500
Turkeys	5,000	10,000
Eggs	175,000	52,500
Total value		$100,000

Forest Products.

	Amount.	Value.
Area of timber lands, cedar, pine, redwood, acres	56,000	$560,000
Fuel, wood, cords	5,000	25,000
Lumber, feet	2,500,000	37,500
Posts, pieces	50,000	5,000
Shakes, thousand	1,000	7,000
Total value		$634,500

Power used for mills and manufactories in county—Steam, 5; electrical, 15

Miscellaneous Products.

	Pounds.	Value.
Bees, hives	.....	$840
Hops	1,800,000	360,000

Manufactories.

	No.	No. of Empl's.	Value of Product.
Cement blocks	1	10	$18,000
Carriages and wagons	3	8	5,000
Cigars	3	5	4,250
Confectionery	2	5	11,500
Flouring mill	1	25	400,000
Foundries and iron works	3	115	2,100,000
Leather goods	4	10	30,000
Malt	1	6	3,000
Meat products—			
Hides		2	11,200
Lard		1	10,000
Meat packed		....	210,000
Tallow		....	3,750
Planing mills	2	30	190,000
Granite and marble	1	2	4,000
Tin and galvanized iron	3	20	145,000
Wool scouring	1	20	250,000
Awnings and tents	1	2	5,500
Soda works	2	10	25,000
Ice plant	1	15	30,000

Manufactured Output.

	Quantity.
Brick, thousand	7,500
Cigars, thousand	85
Flour, barrels	67,200
Malt	60
Hides, pounds	140,000
Lard, pounds	100,000
Meat packed, pounds	1,365,000
Tallow, barrels	250



HORSE PARADE, CALIFORNIA STATE FAIR, 1909.

REPORT

OF THE

CALIFORNIA STATE AGRICULTURAL SOCIETY

FOR THE YEAR 1910



SACRAMENTO:
W. W. SHANNON : : : : SUPERINTENDENT STATE PRINTING
1911

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REPORT

OF THE

STATE AGRICULTURAL SOCIETY.

To His Excellency, HIRAM W. JOHNSON.
Governor of the State of California.

SIR: We have the honor to submit herewith, for your consideration, the Fifty-Seventh Annual Report of the State Agricultural Society.

Besides a statement showing the receipts and expenditures of the society for the past year, we include herein the statistical reports of such counties as have complied with the law by sending in returns, and also some articles on Agriculture and kindred subjects by gentlemen especially qualified to treat the questions considered.

REGARDING STATISTICS.

In spite of the best efforts we can exert, some of the counties continue to ignore the statute which makes it their duty to supply this society, on or before a certain date each year, with statistics of their products. If supervisors could know how much these reports are sought after by students of California and prospective immigrants to the State, and how much publicity the counties that do report receive as a reward for their efforts, we believe the situation would be different. But they do not know this, and, not realizing the benefit, they see only the cost and act on the belief, apparently, that they are favoring their county by saving the hundred dollars or so that would be necessary to secure the report which the law directs. How they can harmonize their oaths to support the Constitution and laws of the State in the face of a deliberate disregard of this particular statute is for them to explain.

As the matter of full and reliable state statistics is of very great importance, and as California is behind most of the other states in the completeness of its industrial data, we are disposed, by way of emphasizing the importance of the subject, to repeat the recommendations made a year ago, which were in effect that to repeal the law and abandon the attempt to collect industrial statistics would be to go backwards, to put California behind the less progressive states. Since this can not be thought of, the thing to do is to so amend the law as to make it effective. Several measures might be suggested to this end, but we believe the simplest and easiest thing to do would be to make county assessors ex officio county statisticians, require of them a house to house canvass in making assessments and collecting statistical data, increase their compensation according to the increased work, and provide a penalty, first, for the

producer or manufacturer who declines to give the desired information; and second, for the official or officials who neglect in any way to carry out the provisions of the law. We suggest imposing this extra duty on the assessors because they are supposed to be better informed regarding values and industrial conditions in their respective counties than other citizens, and because, further, they are already required to collect certain data, and they might as well make one job of it and do the work complete. This is substantially the Kansas law on the subject, and there it works very satisfactorily.

Another effective remedy would be to add to the present law a provision that where county supervisors neglect or refuse to appoint a statistician on or before a certain date, say August 1st of each year, it shall become the duty of the State Agricultural Society to appoint a citizen of the defaulting county to collect the statistics of said county at the expense of said county, and in the event the supervisors refuse to allow such claim, then authorize the State Treasurer to pay the same and deduct the amount thereof from any money due or that may become due from the State to said county from any source.

We know you will agree with us when we say that if this statistical work is to be continued it ought to be so complete as to be of maximum value and a credit to the State, and we ask your valued assistance in helping to bring about such amendments to the present law on the subject as will insure such results.

A BRIEF RETROSPECT.

In 1906, after a spirited contest among the directors, pool selling and book making on the fair grounds were abolished, and the selling of spirituous drinks prohibited. This action on the part of the directors and a simultaneous change of management seemed to mark the turning point for the better. In spite of many obstacles and many discouraging conditions, chief of which was the San Francisco disaster, the fair that year was an improvement on the one of the year before, and each fair held by the society since has been better than the preceding one. This is significant in view of the fact that when the reforms referred to were inaugurated all kinds of dire consequences were predicted. The abolished privileges had been bringing the society twenty or more thousand dollars a year, and it was contended that without this revenue the society could not live. But it did live, and remarkable as it may seem, the deficiency the first year under the reform was not so great as the average deficiency of previous fairs. The touts and sports were not so much in evidence among the visitors, but in their place came farmers, merchants, and other substantial men of affairs with their families, giving the institution a higher and more dignified cast, which recommended itself strongly to the better element of our population. The reform was so radical, so thorough and so effectively enforced as to convince the doubting that the management was in earnest, and at once encouragement began to be received from the press and other influential sources that previously had been opposed to the society, or indifferent as to its welfare. To be sure the management worked hard and under adverse conditions to vindicate its course, but that it stands vindicated to-day must be admitted by all fair critics.

The exhibits each year, by persistent effort, have been better and more representative of our great State and its various resources than the year before, and in time—and not a long time—we hope to hold a fair that will represent not only every product, but every section of this most fruitful of American commonwealths. When that day comes the California State Fair will be in itself a complete exposition of western resources, so comprehensive in the variety of its displays as to attract visitors from all sections of the country who desire to study the possibilities of this rich region of America from convincing living objects.

THE VALUE OF FAIRS.

Fairs are mileposts of progress; they are educators, and they give stimulus to greater endeavor along agricultural, mechanical, and other industrial lines. They are for all the people; they represent all classes, occupations, and conditions of life; they unite city and country and wipe out all class distinction; and they give an uplift to rural life and inspire progress in every branch of honest activity. That they should be encouraged goes without saying, but the maximum benefit can only be realized from a fair that comprehends all it professes to show. In other words, a state fair that represents in its exhibits only part of the state and part of its resources may be worth all it costs, but nevertheless it falls short of its purpose. The management of the California State Agricultural Society realizes this and has spared no effort within its means to extend the influence of the society to the remotest corners of California and draw exhibits to the annual fairs from every quarter and every industry. In this effort they have been successful to a degree that has overcrowded their accommodations.

NEED OF BETTER EQUIPMENT.

The past two years tents and other temporary structures have had to be provided to accommodate the overflow. This last year two temporary grand stands, two temporary live stock barns and two temporary exhibition buildings were erected at considerable expense, and yet we did not have grand stand room enough, nor stalls enough, nor display room enough to meet the demands. This is an unfortunate condition for two reasons: first, the cost of these structures cuts largely into the revenue; and second, visitors and exhibitors who have to accept temporary accommodations feel that they are discriminated against and abate their enthusiasm for the institution, thus causing the society to lose in one direction what it may have gained in another, and rendering the work of promoting the next fair just that much more difficult. To remedy this situation, the society needs a new and larger grand stand, a coliseum or live stock amphitheater, more live stock barns and more exhibition buildings. It feels that the State ought to supply these. It also thinks the State ought to provide a reasonable sum for better fire protection and the planting and care of the Agricultural Park. With proper equipment, of which this society is sadly lacking, compared with that of most other states, the annual fairs in California might be made not only the best, but the most instructive in America, for the reason that our range of products comprehends a greater variety than can be brought together from any similar area of the continent.

THE SOCIETY IMPROVING.

In strength and prestige the society shows continued improvement. With its holdings and attractions now in one enclosure, a change that should have been made many years ago, with proper encouragement and better equipment we are hoping for greater advancement in the future than in the recent past.

The last fair, the fair of 1910, as we have said, was not only an improvement on the fairs of the previous years, but was by far the biggest and best we have ever had. This was due largely to the enterprise of the citizens of Sacramento, the capital of California and the state fair city. They believed in what has become an accepted fact with all experienced fair managers, that more and better side attractions would give impetus to every department of the exposition. They knew, however, that our financial condition justified the directors in conservative action regarding the expenditure of money for such attractions, and through an organization created for the purpose they raised a large sum of money and agreed to become responsible for the expenses of certain attractions, and to take in return all money received at the fair over and above a specified amount. This amount, however, which it was agreed should first go to the society, was in excess of the revenue from the best past year.

Under this arrangement some of the best attractions to be had on the American continent were brought to California, and the result was an attendance more than double the attendance of the previous year, while the fair proper was proportionately greater and better. Producers, manufacturers, and breeders, realizing that the big attractions were going to bring big crowds, exhibited in larger numbers than ever before, pressing our capacity to the limit and compelling us, in spite of the temporary quarters referred to in some departments, to reject exhibits for the want of a place to put them.

Altogether, it was the fair of fairs in California, and while the citizens' committee fell a little short in their proportion of the receipts of the amount they had guaranteed, yet the society did well and the citizens made up their deficiency with alacrity, declaring that the big crowds brought to Sacramento and the incidental expenditures among the citizens and business houses paid them many fold the cost. Indeed, so well pleased were the people generally with the outcome that by practically unanimous request the citizens' committee has been kept intact for the purpose of coöperating with the society on similar lines in the fair of 1911, and we are all confident that with the experience gained this year we will be able another year, crop and industrial conditions being favorable, to hold a still bigger and better fair, and without leaving any deficiencies for the citizens or anybody else to meet.

In brief, it has been amply demonstrated that good attractions pay, and while the state fair officials know and admit that the organization is not created primarily for the amusement of the people, yet, in order to get the people together where they may profit by the educational and stimulating character of a great industrial display, there must be something to amuse as well as instruct. After all, men and women are only grown up boys and girls, and while they are anxious to learn and

improve by what they can see at a big exposition of industrial and live stock resources, yet they take the educational part with better relish and pay the admission fee with a freer hand when they realize they are going to be entertained and amused as well as instructed.

AGRICULTURE THE BASE OF OUR WEALTH.

California has various rich resources, such as mining, lumbering, manufacturing and commerce, yet to-day agriculture and its allied industries produce the big end of the State's wealth. Agriculture, in a great measure, sustains all other industries; upon it the varied commercial, business and professional interests of the State depend. When the farmer is prosperous all are prosperous; therefore, those who work the soil should have all the help that just laws and popular encouragement can give them, and no stimulus has proven greater to this branch of industry than a well conducted and well patronized agricultural fair.

The Federal Government yearly gives more and more attention to agriculture, and is justly proud of the result of this branch of its work. Secretary Wilson, head of the Agricultural Department of the United States, in his latest report says that "Nothing short of omniscience can grasp the value of the farm products of this last year. At no time in the world's history," he continues, "has a country produced farm products within one year with a value of the agricultural products of this country for 1910. The value of farm products from 1899 to the present year has been progressive without interruption. If the value of the products of 1899 is placed at 100, the value for this year is 189, or almost double the value for the census year eleven years ago. During this period of unexampled agricultural production, a period of twelve years, during which the farmers of this country have steadily advanced in prosperity and wealth and in economic independence, in intelligence, and a knowledge of agriculture, the total value of farm products is $79,000,000,000.00."

Of this stupendous wealth from the farms of the United States, California has produced her full share and has kept pace with the rapid increase of production in the country at large. This last year crops of all kinds in this State were good, and prices on the whole were a little more than an average, more particularly as applies to cereals, meats, dairy and poultry products. Of the unprecedented agricultural output of the United States for 1910, California contributed, including her fruits and vegetables, her cereals, live stock, dairy products, hay, poultry and eggs, wine and brandy, beet sugar, hops, hides, wool, etc., not less than $300,000,000.00, or about $115,000,000.00 more than the average of all the states of the Union.

Our output of cereals was conservatively: Barley, which now takes first place in California, 975,000 tons; wheat, 212,000 tons; oats, 140,000 tons; corn, 45,700 tons, and hay, 3,786,250 tons. There is some rye, hemp, flax, and buckwheat grown in this State, but the quantity of these products is not sufficient to enter materially into commercial calculations. Cotton growing in Imperial County and rice growing in the Sacramento Valley have attracted considerable attention the last few years, and in the case of the former the acreage and annual yield is

increasing very rapidly, promising soon to add a material item to our State agricultural wealth.

Wool shows a gradual decline, falling off from 26,000,000 pounds, in round numbers, for the banner year of 1902, to 13,300,000 pounds in 1910. The number of sheep in California is 1,900,000, which gives an average clip of 7 pounds, as against an average of 7.05 for the Western States, or 6.7 for the United States. About one third of the wool in this State is clipped in the fall and about two thirds in the spring.

Our dairy industry grows with the increase of irrigation and the advance of intense farming, the total output from all branches of this industry last year being, according to the State Dairy Bureau, which perhaps has these figures more complete than ours, $28,256,609.00, or an increase of $2,000,000.00, in round numbers, over the year before.

The sugar beet industry is making rapid strides, the figures of 1910 showing an increase in the yield of sugar over 1909 of more than a million pounds, or a total of 290,000,000 pounds. The hop crop was a fair average, aggregating about 6,500 tons. Beans fell off from the record yield of 1909, yet the crop was the largest excepting that of last year ever harvested in California, being carefully estimated at 85,000 tons. Our figures are only partial on some products, of which honey is one. Last year, 1909, we had a big yield, figured by some as high as 11,000,000 pounds; this year the output is about half, or estimated at 5,500,000 pounds.

California's horticultural output, which has become a leading item in the State's wealth, averaged well with recent previous years, while prices on the whole were such as to insure fair returns to the producers. Not taking into account the large amount of fruit that goes into local consumption, and taking our figures from the shipping exchanges and the packers, or as gleaned from them by the California Fruit Grower, an accepted authority, along with some obtained from independent sources, the yield from California's orchards, vineyards and gardens last year, or for 1910, was substantially:

Fresh deciduous fruit shipped out of the State, exclusive of apples	11,933 cars
Apples shipped out of State	2,104 cars
Citrus fruit shipped out of State	33,099 cars
Raisins cured	62,500 tons
Prunes cured	37,000 tons
Peaches cured	25,000 tons
Other fruits cured	23,775 tons
Canned fruit (estimated)	3,500,000 cases
Canned vegetables (estimated)	1,500,000 cases
Fresh vegetables exported	89,780 tons
Almonds produced (estimated)	3,500 tons
Walnuts produced (estimated)	4,500 tons
Wine produced (estimated)	46,000,000 gallons
Brandy produced (estimated)	6,500,000 gallons

Reducing all these figures to a dollar and cents basis, the tremendous value of the farm, orchard, and vineyard interests of California are apparent at a glance, and in these figures the live stock interests, which are valued at $50,000,000.00, are not taken into account, barring the reference to wool, nor is the olive crop, now worth at least $1,000,000.00 a year to the State, included.

Mining is important, lumbering is important, commerce and manufacturing are important, but they all lean more or less on agriculture. What makes for the uplift of the farm and the farmer makes for the prosperity of the State; hence any measures in law or policy wisely aimed to better the condition of agriculture or the agriculturist in California should meet with generous approval.

Very respectfully,

H. A. JASTRO,
President.

Attest:

J. A. FILCHER,
Secretary.

FINANCIAL STATEMENT.

February 1, 1910, to January 31, 1911.

SUMMARY.

RECEIPTS.

1910.		
Feb. 1—Cash balance		$346 46
Park and pavilion receipts		30,283 80
Rent		1,950 95
Entrance due		674 05
Futurities		4,164 00
Fred L. Martin, special treasurer		2,756 00
California National Bank		540 26
American Shorthorn Breeders' Association		820 97
Appropriation for aid		20,000 00
Total		$61,536 49

DISBURSEMENTS.

1911.		
Jan. 31—Expense		$14,891 95
Races		5,112 00
Salaries		6,525 00
Pay rolls		6,428 85
Advertising		3,726 57
Interest		29 63
State Treasurer		2,205 71
Building and improvement		7,949 62
Premiums		14,465 03
Cash		202 13
Total		$61,536 49

CEREAL CROP OF CALIFORNIA, 1910.

By T. C. Friedlander.

The year 1910 has accentuated the change that has been working for some years in the cereal products in the State of California. Barley has easily taken first place with the largest crop yet harvested. The total is estimated by the United States Department of Agriculture to be 971,900 tons of 2,000 pounds each, as against a crop of 750,000 tons in 1909. These figures are larger than the general trade estimates, but the difference between the two crops is conceded to be about what the department figures show. The value of the 1910 crop is about $19,000,000. Exports by sea from the first of May to the thirty-first of December, 1910, have been 207,615 tons, and an amount estimated at 20,000 tons has gone forward by rail. While the exports have practically all been for malting purposes, the bulk of the crop is used for feed purposes, barley being the staple feed crop of the State, occupying the same position that corn does in other parts of the United States. This is the grain of greatest economic worth to California, and this will be constantly accentuated as the acreage to alfalfa and other grasses is increased and the raising of live stock assumes larger proportions.

California has not for some years raised sufficient wheat for its own consumption. The crop of 1909 was 201,000 tons, with the total consumption estimated at 435,000 tons. The small yield of wheat of later years is owing in some measure to unfavorable seasons, but is chiefly due to the change of acreage from wheat to barley.

The other cereals play a minor part in the cereal production of the State, but it is to be hoped the cereal investigations now being conducted by the agricultural department of the University of California will result in discovering a species of corn that can be profitably raised under California's conditions of climate and soil and take its place with barley as a feed crop.

In the years to come an increase in the crops of both wheat and barley can confidently be expected. As already stated, the demand for barley will be constantly on the increase. This will insure good prices, and with the price of wheat as attractive as it has been for the past few years, farmers will continue to seed to these grains.

Perhaps the more important factor in large crops will be better farming, such as deeper plowing, selection of seed and approved methods of dry farming, insuring much larger yields per acre.

WHEAT CROPS AND DISTRIBUTION.

The following table shows the rainfall at San Francisco for a series of years and the wheat crop of California and distribution, in centals:

Season.	Rainfall.	Crop year.	Crop.	Exports.	Local consumption.	Carry over stock.	Imports.
1889-90	45.85	1890	18,889,680	17,388,400	6,300,000	1,977,940	1,740,440
1890-91	17.58	1891	21,095,440	16,586,380	6,000,000	2,451,000	1,964,000
1891-92	18.53	1892	20,445,960	13,489,480	6,300,000	5,727,580	1,520,100
1892-93	21.75	1893	19,904,640	11,883,540	6,500,000	7,878,980	1,630,300
1893-94	18.47	1894	14,335,844	11,095,480	7,200,000	6,456,000	2,536,660
1894-95	25.70	1895	15,730,004	13,613,980	6,800,000	2,930,700	1,168,560
1895-96	21.25	1896	17,452,041	13,452,693	7,000,000	1,990,272	2,060,224
1896-97	23.43	1897	18,351,786	12,907,953	6,800,000	3,388,606	2,754,501
1897-98	9.38	1898	7,341,220	4,259,913	7,000,000	3,585,606	4,115,693
1898-99	16.87	1899	19,462,047	9,455,737	6,860,000	8,615,583	1,383,667
1899-1900	18.47	1900	12,230,516	11,211,648	7,190,000	4,218,718	1,774,267
1900-01	21.17	1901	18,620,263	13,710,220	7,270,000	2,984,147	1,125,386
1901-02	18.98	1902	11,255,698	8,576,530	6,785,000	1,401,910	2,523,595
1902-03	18.28	1903	8,958,599	3,631,899	7,181,500	2,636,430	2,950,320
1903-04	20.59	1904	6,537,131	3,665,370	7,306,660	1,105,539	2,904,008
1904-05	23.45	1905	3,197,138	1,800,922	7,535,920	1,684,878	6,885,073
1905-06	20.42	1906	6,001,439	1,648,493	7,442,000	1,725,547	3,129,723
1906-07	26.17	1907	3,843,090	1,319,995	7,550,000	890,907	4,192,265
1907-08	17.35	1908	3,219,110	821,893	8,172,000	1,033,604	5,917,480
1908-09	25.57	1909	4,021,714	845,918	8,700,600	1,424,568	5,915,768

ACREAGE AND PRODUCTION OF BARLEY IN CALIFORNIA.

Compiled by the U. S. Department of Agriculture.

Year.	Acreage.	Average yield per acre, bushels.	Production, centals.
1892	845,240	----------	9,737,164
1893	760,716	----------	8,215,732
1894	737,895	----------	5,323,681
1895	937,127	20.3	9,131,365
1896	918,384	21.6	9,521,805
1897	881,649	23.0	9,733,404
1898	872,833	10.5	4,399,078
1899	855,376	26.0	10,675,092
1900	889,591	16.7	7,130,961
1901	1,089,785	26.0	13,600,526
1902	1,144,274	26.0	14,280,539
1903	1,201,488	25.7	14,821,556
1904	1,237,533	22.7	13,484,160
1905	1,237,533	21.5	12,771,340
1906	1,425,000	27.2	18,760,000
1907	1,040,000	28.9	15,028,000
1908	1,082,000	23.5	12,204,960
1909	1,180,800	26.5	15,009,600
1910	1,306,387	31.0	19,438,040

WHEAT QUOTATIONS, 1909–10.

Average, highest and lowest prices of No. 1 white wheat for each month of the past cereal year. Quotations based on actual transactions in sample market:

Month.	Average.	Highest.	Lowest.
1909.			
July	$2 10	$2 15	$2 05
August	1 87½	2 00	1 75
September	1 72½	1 80	1 65
October	1 82½	2 00	1 65
November	1 82½	1 85	1 80
December	1 97½	2 00	1 95
1910.			
January	$1 97½	$2 05	$1 90
February	1 93¾	2 00	1 87½
March	1 85	1 95	1 75
April	1 67½	1 80	1 55
May	1 54⅜	1 58¾	1 50
June	1 45	1 50	1 40

BARLEY QUOTATIONS, 1909–10.

Average, highest and lowest prices of No. 1 feed barley for each month of the past cereal year. Quotations based on actual transactions in the sample market:

Month.	Average.	Highest.	Lowest.
1909.			
July	$1 45⅝	$1 48¾	$1 42½
August	1 40	1 45	1 35
September	1 37½	1 40	1 35
October	1 40	1 45	1 35
November	1 45⅝	1 47½	1 43¾
December	1 48¾	1 52½	1 45
1910.			
January	$1 41¼	$1 50	$1 32½
February	1 37½	1 40	1 35
March	1 40	1 45	1 35
April	1 22½	1 35	1 10
May	1 10⅞	1 15	1 06¾
June	1 05	1 10	1 00

CALIFORNIA FRESH FRUIT.

By F. B. McKevitt, Manager California Fruit Distributors.

The marketing of a great crop of shipping fruit such as California now produces is a problem deserving of most careful study on the part of growers and shippers alike. Did we have our own crop alone to consider the solution would be easy, but California is not the only State with great horticultural interests. Texas, Georgia, the two Virginias, Delaware, Maryland, New Jersey, New York, Ohio, Michigan, Missouri, Arkansas, Colorado, Idaho, Utah, Washington and Oregon are all heavily interested in the same lines of fruit growing and while it is true we have a much greater range of production, including some varieties that are not grown at all elsewhere, we can not escape the financial consequences of the competition of their products, but must endeavor to so shape our course that we will minimize it to as great an extent as possible. How to do so successfully is the problem and the solution justifies all the thought, care and expense demanded by interest that controls the prosperity of thousands of our fruit growers and involves sales of a gross value of $12,000,000 to $15,000,000.

The first thing we have to do, after the season has advanced far enough to allow us to estimate our own production, is to figure what other sections will have. We must have the best information obtainable on this subject, covering not only probable production, but also the time of ripening. Records show what it has been in the past, and then, as the season is reported, so many days earlier or later, we can estimate, with normal weather conditions, the time when to expect their heavy shipments and so avoid them as much as possible. The season in California must be considered also, as it occurs every now and then that a little difference in ripening—earlier here and later there, or vice versa, may make a profitable opening for a variety that at any other time perhaps would not bring freight. Certain sections of the country outside of California market their shipments in some markets to the comparative exclusion of others—this tendency must be known and taken into consideration, avoiding as far as possible those markets likely to be overloaded with competitors' stocks, and shipping more heavily to others that they do not, or can not reach. The conditions referred to have more bearing upon the shipment of peaches than any other variety, as that is the competing fruit produced most largely in the south and east, but have their effect on all varieties, since we cannot expect to sell any fruit at high prices if the market is supplied with local stock which is both plentiful and cheap.

When crop and market conditions have been determined and shipment begins then comes the necessity for such a distribution of our fruit among the different markets as seems likely to secure best returns for same. No actual systematic distribution is possible unless a large volume of the business is controlled by one central agency. So long as

considerable shipments are made by independent operators, distribution is rendered more or less uncertain. Every shipper, independent or otherwise, will strive to reach the best markets, but a lack of knowledge as to where the shipments of others are going will always handicap distribution and to a considerable extent nullify it. It is only a few years ago that all shippers were acting independently with the result that frequently markets were overloaded with consequent heavy losses, and others left under-supplied where a small quantity of fruit would sell at high prices. The complaints of the losing growers who depended on these sales, not only for their profits, but for very existence, were generally met with the explanation that other companies had shipped in so many cars that they overloaded the market and it could not be helped. Then the shippers all and singly came in for a sound scoring because they did not "get together" to prevent such senseless slaughter. It was in obedience to this demand, and in recognition of the fact that something must be done to remedy the evil, that the California Fruit Distributors was organized. So far as the business of this corporation was concerned the evil was remedied, distribution was accomplished, red ink returns instead of being a common thing became almost unknown; then the grower began to worry because he was afraid the shippers had formed a "trust," and his interests were in danger. This idea has been systematically encouraged by competitors who depend largely upon that alone to increase their business, and who are unwilling to spend a portion of their earnings in supporting and upbuilding an institution which from the very nature of things can not prosper without bringing prosperity to the growers in an even larger measure than to the shippers. If good distribution means better prices for fruit, then every grower who wishes to prosper, and desires to see the industry prosper, should support an institution which is working to bring this about and which is able to do so. It is a well known fact that a large percentage of the fruit shipments of this State is handled for the grower's account. He grows, picks, packs, and delivers his fruit to the firm with whom he is doing business and same is shipped and sold for his account, the amount realized, less established and well known charges, going to him. No effort is spared to secure the best results as satisfactory returns mean satisfied and friendly growers—a result that is of far greater value to the shipper than the small profit received; the work of the California Fruit Distributors, contributing so largely to this end, does not add one cent of expense to the grower, being entirely covered by an assessment levied on the business of the shipper.

There never will be anything in the nature of a trust in this business. Fruit is most largely sold at auction; these auctions are open to all, and can be and are used by growers who ship in car lots. It is not likely that any other method than this will ever be used by California fruit shippers in the large cities, but should the business retrograde to the private sale plan, that is as open to the grower as the other. If all fruit sent out was purchased by the shipper, and the grower was compelled to take such a price for his product as was offered, or let it stay at home, there would be danger, but as it is the grower can either sell f. o. b. if the opportunity offers, or send it forward on consignment, to be offered for sale to competitive buyers who

will base their bids on the value of the fruit. The shipper sends his own fruit to these markets he must sell it in the same place, in the same way, and to the same buyers, enjoying no advantage whatsoever in its sale that is not open to every grower. With these opportunities open to him, the ability to purchase supplies at fair prices and with the lowest commission charge known for similar service, the California grower is well protected and never need be misled by the cry of "trust" to lose faith in those who are his friends, many of them fruit growers themselves, and who are now, as they have been in the past, working hard to advance the interests of the fruit industry of this State.

Leaving you with these few thoughts upon marketing, we will proceed to consider briefly the shipments and results of the past season.

At the opening of the season we were confronted with the prospect of having to meet unusually heavy competition from the fruit of other sections. Texas, which produced very little in the preceding season came to the front with a crop of peaches of 4,200 car loads, followed by Georgia whose output of 2,100 car loads in 1909 was nearly three times as heavy, amounting to 6,100 car loads in 1910. Then came Delaware, Maryland and New Jersey with a yield of over 3,000 car loads against a practical failure in 1909; New York with 4,000 car loads of peaches and nearly as many more of grapes; Ohio, including the islands of Lake Erie, marketed over 1,000 car loads of peaches; Connecticut, 500 cars of peaches; Arkansas and Missouri, 700 cars of peaches; Colorado and Utah, 1,000 cars of peaches, and Washington 2,000 cars of peaches. In addition to this Michigan, although badly crippled by frost, produced considerable quantities of both peaches and grapes. West Virginia had an abundant crop, and old Virginia, although not a large producer, appeared in the arena not only with a good crop of all varieties, but surprised everybody with a crop of cherries which appeared in market as early as May 10th.

Nor was California behind in the race. Our fruit crops of all kinds were heavy with the exception of table grapes which were cut down nearly 1,000 cars from last year's output. With this heavy crop in sight, and a certainty of a low dried-peach market, the great problem of marketing our vast output profitably was a serious one and caused many misgivings as to the financial results. We are now able to look back on the history of the season and may congratulate ourselves upon the happy outcome. While no fortunes have been made, the results have been considerably above the average, and most of our growers have something to show for their efforts. That this is the case is owing largely to the effective system of distribution employed, to improved selection and packing of our products through the standardization movement inaugurated and enforced in many of our principal districts, and so far as peaches are concerned, to the good fortune which enabled us to ship a considerable percentage of them at a time when there was a gap in eastern crops.

Cherry shipments were of the same volume as last year, the figures being $250\frac{1}{2}$ cars against $249\frac{3}{4}$ in 1909. The first car was shipped April 29th; it was a full car, containing over 24,000 pounds, and was made up principally of Vacaville fruit, but included shipments from Suisun and Sacramento. The season opened nine days earlier than last year. The crop was of good quality, carried well and gave satis-

faction to the trade. Prices were above the average and some exceptionally good sales were made as is shown by the fact that the first sixteen cars shipped by this organization grossed $65,350.00 or over $4,000.00 per car. The demand for this fruit is increasing and several markets are now car lot handlers where a few years ago express shipments covered all their requirements.

The apricot crop was good and shipments exceeded those of 1909 by 80 car loads, the exact figures being 209½ cars in 1909 and 289¾ cars in 1910. Considering the larger quantity shipped, prices were fairly satisfactory. This fruit has never been a favorite with the eastern public, owing undoubtedly to the fact that it must be picked rather green to insure sound arrival, and therefore is almost entirely lacking in the delicate flavor which, could it be preserved, would make it more popular.

Shipping plums of nearly all varieties were a good crop throughout the State. Shipments were 1,552½ cars as compared with 1,526¼ in 1909. Outside of the early shipments which were injured by a few days of hot weather, thereby checking their growth, the fruit was of good quality and sold at prices considerably above the average. Plums are growing in popularity every year; it is to be hoped that this will continue to be the case as many new orchards have been planted and a large acreage of old orchards of peaches and apricots is being worked over to the new variety. Plum production seems likely to double in the next five years.

The pear crop was good, but not heavy. Shipments were 2,361 cars against 2,638 in 1909. Prices realized were not as high as last year owing to the fact that the great bulk of our shipments were offering at a time when very heavy consignments of Georgia peaches were being marketed; these peaches sold at low prices making it difficult, if not impossible, to dispose of large quantities of pears at high prices. The latter part of the season showed very satisfactory results. Winter pears were a light crop; they were in strong demand and sold well. Canners were liberal purchasers of Bartletts and paid very good prices, the quantity used by them more than offsetting the decline in eastern shipments. There has been no material change in the conditions of our pear orchards. While there has been some "fire blight" it has not been of a serious nature and generally speaking we may say that the pear orchards of the State are in as good condition as they were one year ago. No expense should be spared, however, in cutting out and destroying blighted limbs wherever they appear, as whenever climatic conditions are favorable we may expect the return of the disease in virulent form, unless before that time we are successful in completely cleaning out all infection.

Peaches: Notwithstanding the fact that the United States produced in 1910 the largest peach crop in its history, this State shipped nearly as many cars as in the preceding year, the figures being 2,518 this season against 2,599 in 1909; strange as it may seem we realized better returns this year than last.

Opening prices for dried peaches were so low that the fruit was not worth over $10.00 per ton for drying. This accounts for the heavy shipment, a considerable portion of which fortunately for us came at a time when a partial break in eastern supplies enabled us to sell at

very satisfactory prices. The Elberta was the best selling variety. Picquet's Late and Salway as usual sold very low, and so far as eastern shipping is concerned, our growers would make no mistake to eliminate them entirely. It would be well for us if more peaches of the Elberta type and ripening at different seasons could be found, as its large size and high color make it a great favorite. The great lack in the State to-day, as we have pointed out in the past, is a succession of highly colored and good sized varieties of peaches with thick skins. With regular supplies of such fruit, markets can be found that would take them throughout the season regardless of the crops of other sections, except, of course, that we would have to meet them on price. The peach industry is not in as good condition as it should be and that is because the price of dried peaches has fallen so low. These low prices do not indicate that the product is unpopular, because it is not, but the reason is to be found in the fact that the consumer is to-day paying as much for it as he did years ago when living prices were paid to the grower. We believe the retailer is the man who is killing our business by preventing the extensive demand that low prices would bring, and unless we can find some means of reaching the consumer and dealing with him direct, there seems to be little hope for a change. For this reason, if no other, the fruit growers and dealers of California should do everything in their power to secure the "parcels post," which would enable them to come into direct personal relations with consumers all over the country, supplying small packages of assorted fruits delivered at their homes for a reasonable price and introducing our products into thousands of families where it has as yet never been used.

With a stable and profitable market for dried fruit we are safe, as then we can either ship or dry, regulating our procedure in line with what seems likely to prove most remunerative.

Grape shipments promised early in the season to be of about the same volume as in 1909. Generally speaking, the crop did not set as heavily as last year, but the increased acreage of young vineyards coming into bearing was expected to rather more than offset this condition. Shipments which were 5,880 cars in 1909 fell to 4,945 cars in 1910, this decline being accounted for by considerable losses in the Fresno district by mildew and a few days of hot weather, and in other sections, where the Tokay is the principal crop, by the latter. Thompson Seedless and Malaga grapes were in strong demand, and sold at satisfactory prices. Early and late Tokays also sold better than usual. During the height of the season prices on all grapes dropped to a low level and many cars were sold at a loss. Emperors, when of good quality, sold well, but a considerable portion of the crop was not up to the standard and in consequence brought low prices.

The total shipments of deciduous fruit for the season, exclusive of apples, amounted to 11,993 cars; the average selling value, as nearly as it can be determined at this time was about $1,100.00 per car. Estimating the average freight and refrigeration per car at $390.00, commission $77.00 and loading $20.00, the gross charges against each car would aggregate $487.00, which being deducted from $1,100.00 leaves $613.00 per car returned to the grower, or a total in round numbers of $7,315,000.00 out of which must be paid all expenses for producing the crop and getting it ready to market.

Railway service during the season was better than ever before until nearly the close, when it "fell down" as usual. A schedule of about one hundred and forty-five hours to Chicago was put into effect by the Southern Pacific for the benefit of the orange growers, which service was subsequently extended to our shipments. The Atchison, Topeka and Santa Fe Railroad maintained the same schedule, and their service was also satisfactory.

The Western Pacific Railroad made its entry into the fruit business this year and transported a considerable percentage of our shipments. Their initial service was rendered in remarkably short time, their fruit trains almost approximating the time of passenger service, and in all cases equaling the best service of other roads. The new line has fully demonstrated its ability to handle successfully this class of business and will undoubtedly grow to be a very important factor in the fruit industry of the State.

The refrigerator car service has been satisfactory. This branch of the business is in strong and capable hands, and the fruit growers of California have reason to congratulate themselves in having their interests so carefully looked after. Owing to the reduced crop, the car supply was adequate, a slight trouble from shortage occurring but once during the season, but demonstrating the fact that the supply is not yet quite equal to the demands of the business. With the natural increase in shipments more equipment will be needed another year and we wish now to call the attention of the officers of the Pacific Fruit Express car line to this fact, so that the necessary steps to provide for the business may be taken in time.

In regard to the question of rates much might be said, but it is largely a repetition of the old story which we all know so well. We are a long way from our markets and at best it will always cost us a large percentage of our sales for transportation and refrigeration.

Immediately following the close of last fruit season the chief horticultural officer of California called a number of meetings in various fruit centers for the purpose of directing attention to evils resulting from indiscriminate and faulty packing of our green fruits and lack of care in throwing out and rejecting all imperfect, wormy or defective specimens. These meetings awoke widespread interest, were well attended, and resulted in steps being immediately taken to secure the standardization of our pack. The plan was followed out in several districts, where salaried inspectors passed upon the fruit before it was loaded into the cars, allowing nothing to go forward that did not conform with the standard established. The result of this work has been plainly apparent throughout the season, purchasers being well pleased and rejections much less frequent than in past years. We believe that a very considerable portion of the good success attending the marketing of our crops this season is directly traceable to this work and we extend our congratulations to State Commissioner of Horticulture Jeffrey for his farsighted action which has resulted beneficially already and with its universal application will work a lasting benefit to the whole industry.

THE CALIFORNIA ALMOND GROWERS' EXCHANGE.

By Manager J. P. Dargitz.

In reporting the accomplishments of the California Almond Growers' Exchange for the first time we should probably preface our remarks by saying that we have really only a partial year's work upon which to base our report.

The work of organizing was begun on the 18th day of March and at the present time we have a good portion of the crop still unsold. Therefore, the report must be only a partial one. It is not necessary to go over much ground in detailing the events which led up to this organization.

The almond growers having for several years attempted in various localities to effect something of an organization to secure more stable markets and better facilities for marketing their product, about five different local organizations had been working for one or more years, and they were brought face to face with the fact that working independently of each other their product was constantly in competition with itself as far as the grower was concerned. In order to overcome this it was deemed advisable to attempt an affiliation of these various local associations into a central exchange, or marketing body. In carrying out this idea eleven different associations were organized and incorporated under the new law as non-profit coöperative associations. These through equitable basis of representation were joined together in the California Almond Growers' Exchange as a central or marketing body. This body was also incorporated on a plan similar to the local associations all of them being non-profit coöperative organizations, wherein the individual grower becomes the unit in determining and controlling the policies. The work and scope of the central body are limited to the securing of supplies and information necessary for its various members and the members of its affiliated associations, and giving the best instruction in regard to a uniform and properly prepared product for market. Also determining the market conditions of the world affecting the almond crop and place these conditions before its members, and marketing the crop.

We have recognized the inability of each individual member to obtain for himself all this information, but by coöperation it is possible to gather such information and place it in a condensed form before its various members. Heretofore it has been a very easy matter for certain interested parties to determine quickly the result of any particular crop damage in foreign almond growing countries, and then, before the grower in California could become aware of these conditions, said parties would send their agents out through the country and buy the growing crop at a price which means a handsome profit to the people who buy. The result of this organization will be in the future to prevent any such action as the members will be posted promptly in case of anything of this kind.

Starting out as late as we did to effect the organization, it has been considered very good work to have secured about forty per cent of the tonnage of the State for this association during the first year. Of course, we expected many obstacles would have to be met and overcome, and we have not been disappointed in the number of these obstacles that we have found in our path. It was only natural that those who had profited by the past methods of handling the almond crop of this State should be disinclined to give up the business which they had established, and which meant no inconsiderable income to them. Therefore, efforts were made to head off the organization by starting out to buy the growing crops from the various districts as early as the last days of March, and paying unusually good prices. The growers in many cases were unaware of the efforts at organization. More of them were unaware of the damage to foreign crops, and in some cases failures of former efforts at coöperative marketing on the part of growers of various fruits were flaunted before the eyes of the almond growers by interested parties, and they were very earnestly assured they needed to be cautious. In addition to this, we have had the largest almond crop in California this year that has ever been produced and this, naturally, would have meant low prices. We have had political disturbances throughout the nation practically equal to the presidential campaign, and this has had its effect to keep down prices, yet in the face of all these disturbing elements we have been able to steady the market and maintain prices so that we feel growers have profited to the extent of between $100,000 and $200,000 on their crop this year. Under prevailing conditions affecting the markets, if it had not been for the work of this exchange in maintaining prices and steadying the market, we feel sure that prices would have been unusually low, and operators, who bought as a speculation in March and April, were fortunately able to protect themselves because of this organization. The growers who remained outside of the organization, as is often the case, were able to profit by its work, being able to sell at good prices established by this association their product, while members of the association had to hold their crop in the warehouse in order to maintain the market.

However, this is all history now and practically all of the unsold portion of the crop of 1910 is in the possession of this exchange, and, therefore, there should be no thought of demoralizing the market by forcing sales indiscriminately. The present holdings are not large, being very much less than 500 tons, and every report of market conditions and supplies, which we are able to gather, indicates that the holiday trade will clean up everything in the dealers' hands and then they will call upon us for the stocks we are holding. It is a self-evident fact that when the trade is slow to buy if we press the matter of selling we will break the market. This we can not afford to do. It would be equally injudicious for the growers and for the trade. The trade is, in a measure, cautious about buying, fearing that the growers will not hold their product long enough to meet the legitimate market demands, but that becoming frightened they would dump everything on the market and so utterly demoralize the same. But in all the history of coöperative organizations no greater spirit of loyalty has been shown than by the members of the California Almond Growers' Exchange.

Here are the conditions in a nut shell: The general business of the country is cautious, buying only for the immediate needs; double the average crop of the State; doubt as to our ability to maintain prices; our efforts to maintain the prices which the legitimate trade of the country warrants in the face of supply and demand.

Suppose with a sluggish market that we as growers would have dumped all our holdings on the market at once, being twice what the trade wanted, and what would have resulted? Prices would have dropped 3 or 4 cents a pound, which would have meant more than $200,000 to the almond growers of California on this year's crop, and that is exactly what would have happened in our judgment but for the California Almond Growers' Exchange.

If there is any serious doubt about this, there is yet time to prove it. Put our 450 tons of unsold almonds on the market and force a sale in the next ten days, and the proof will be evident. But by holding on and selling as the trade requires, we can close out all our holdings in the next three to four and possibly five months at maintained prices, and the growers will have won the day.

We have learned some things in this our first year's experience.

First—We must have uniform bleaching and grading of almonds. This can be done by each local association having its own warehouse and bleaching plant, so that one competent man for each association can do the work. As this will save at least one third the expense of having it done by the individual grower, it ought to be brought about.

Second—A better marketing arrangement, perhaps our own brokers.

Third—Some arrangement by which we can advance one half the value of the crop to the grower upon delivery whether it is sold or not. This is done on grain and should be done on nuts and will be very likely hereafter.

This organization must not be permitted to buy for that would permit of speculation, which spells ruin to any coöperative marketing organization.

This is but a culmination of long efforts, which have been working for the betterment of the tillers of the soil as well as the orchardist and vineyardist. Generally speaking, the period from 1785 to 1850 represented the idea of preparation for the betterment of the agriculturists and horticulturists through coöperation. The next period covering the years from 1850 to 1870 has been indicated as the period of agricultural exhibitions of county fairs, which was a step in the direction of improving the product of the field and orchard. From 1870 to 1893 begun the period of organization among this class of people.

A mistake was made in beginning at the top instead of the bottom for the work of organization, and an attempt to centralize power and to form organizations that were too large and unwieldy to be properly handled without experience, led to the necessity of having a different form of organization. Since 1893 is the period in the United States which has pointed to the work of coördination of various organizations, that is making a unit of the individual grower and then local associations of individual growers being generally gathered in large coöperative movements.

Not the least of the beneficial effects resulting from the work of the California Almond Growers' Exchange is the gathering of marketing

conditions from the world at large. The selling or actual marketing is but the conclusion of the work. It has been deemed essential that we gather information from various almond growing districts of the world, which shall be utterly unbiased and perfectly reliable. The International Institute of Agriculture of Rome, Italy, has afforded us this opportunity. Through the Honorable David Lubin, the United States representative to this International Institute of Agriculture, we have been able to gather very much information and with his advice, and by the efforts of Congressman Kahn of San Francisco, we have been able to get instructions from the departments at Washington requesting the International Institute of Agriculture to secure and prepare for us reports concerning the almond growing sections of the world, and we hope within two years to have this feature of the work so well organized that no climatic or other conditions affecting the almond crop for better or worse in any country of the world, but will immediately become the property of every other almond growing country. This will unquestionably work out the problem of determining the actual market value of the almond crop of California in any year on the basis of supply and demand of the world.

It is not our purpose to create a trust, nor is it our purpose to unduly inflate prices, but it is our purpose to determine what the almond crop should be worth in any given year and to steady and maintain such a price. Whenever the grower, the consumer, and the legitimate trade learn just what this means they will all favor the proposition, and we look to see the day when almond buyers and almond brokers will be just as much pleased with the work of this exchange as will the almond producer and the almond consumer.

THE CALIFORNIA RAISIN INDUSTRY.

By George Robertson.

California, within a generation, has made a world-wide reputation for all its fruits, and produces more than one quarter of all the fruit raised in the United States. New York being second, but a long way behind. Practically all dried fruits produced in the United States come from California.

That there is still ample room for the further development of the fruit industry in this State is proved by the fact that in 1908 we imported foreign fruit and nuts to the value of $37,354,000, and in 1909 to the value of $31,110,000, while the exports of domestic fruit and nuts were only about half these sums, amounting to $14,338,000 in 1908 and $16,568,000 in 1909.

OUR TEN BEST FOREIGN CUSTOMERS FOR FRUIT AND NUTS IN 1909.

	Value.
United Kingdom	$5,400,411
British North America (Canada)	4,635,285
Germany	2,506,051
Netherlands	1,349,769
Australia and New Zealand	347,050
France	325,579
Belgium	320,478
Cuba	252,182
Mexico	190,451
South America	127,390

The effect of the great expansion of the California raisin crop has had the satisfactory result of greatly decreasing the imports of foreign raisins, which, in 1884, amounted to nearly 54,000,000 pounds, but in the last three years have only averaged about 6,000,000 pounds, while the exports of California raisins have increased from 3,000,000 pounds in 1898 to nearly 8,000,000 pounds in 1909.

The quantity of Sultanas imported into the United States is not so great as is generally supposed, the average for the last two years being under 2,000,000 pounds. The imports of currants have remained remarkably steady for the past fifteen years. The largest quantity imported was 52,000,000 pounds in 1894, when they were duty free, and the smallest the following year when the duty was 1½ cents per pound, with the result that the imports fell off to 16,000,000 pounds. As a matter of fact, currants stand in a class by themselves, and do not compete to any extent with raisins.

Year.	Sultanas imported. Pounds.	Currants imported. Pounds.
1902	2,030,374	36,238,976
1903	3,055,398	33,878,209
1904	3,850,444	38,347,649
1905	1,685,275	31,742,919
1906	7,372,568	37,078,311
1907	1,052,519	38,392,779
1908	1,638,028	38,652,656
1909	2,760,386	32,482,111

HISTORY OF THE PRODUCTION OF RAISINS IN CALIFORNIA.

The grapevine has long been cultivated in California. The Mission Fathers were the first to grow successfully the European grape in this State. They had but one variety, which is still largely grown, and is known by the name of the Mission grape. It was planted at San Diego in 1769, San Gabriel in 1771, Los Angeles 1781, and Santa Barbara in 1786, and was largely used for wine making. It was nearly eighty years later before the raisin grape was introduced into California.

THE FIRST INTRODUCTION OF THE RAISIN VINE.

In 1851 Colonel Agostin Haraszth of San Diego grew some Muscatel vines from seeds of Malaga raisins. In March, the following year, he imported the Muscat of Alexandria from Malaga, Spain, and ten years later, during a visit to that place in September, 1861, he selected cuttings of the Gordo Blanco, which were afterwards grown and propagated in his vineyard in San Diego County. He was thus the first to introduce the raisin vine into California. Another importation of the Muscat of Alexandria was made in 1855 by A. Delmas, and planted at San Jose. G. G. Briggs of Davisville also imported Muscatel grapevines from Spain, while R. R. Blowers of Woodland, Yolo County, started one of the first raisin vineyards in 1863 from Gordo Blanco cuttings received from Colonel Haraszth.

EARLY VINEYARDS IN SOUTHERN CALIFORNIA.

In the more southern parts of the State, Riverside entered the field in 1873, when Judge John Wesley North, the founder of the colony of that name, first planted the Muscat of Alexandria; but grape growing in that district did not become general until about three years later. In El Cajon Valley, San Diego County, the same variety of raisin vines were planted by R. G. Clark in 1873, but most of the vineyards in that county were not planted until 1884-86. In Orange County raisin grapes were also planted about the year 1875-76 by MacPherson Brothers, who, at one time, were the largest growers and packers in the State. Raisins were also produced in San Bernardino and Los Angeles counties in former years, but owing to the ravages of what has since become known as the Anaheim disease, which destroyed thousands of acres from 1884 to 1889, growers became discouraged, and oranges and lemons have taken the place of vines almost entirely.

BEGINNING OF THE RAISIN INDUSTRY IN CENTRAL CALIFORNIA.

In 1876 W. S. Chapman imported some of the best obtainable Muscat vines from Spain for the Central California Colony in Fresno County, which, however, proved in no way different from those already growing in that county. Who produced the first raisins in California will probably never be satisfactorily proved. According to a report of the California State Agricultural Society, raisins were exhibited by Dr. J. Strentzel at the state fair in 1863. The first successful raisin vineyards in the State were those planted by G. G. Briggs of Davisville, in Solano County, and by R. B. Blowers of Woodland, Yolo County. The former vineyard contained mainly Muscats of Alexandria, and the latter, Gordo Blanco. Both these vineyards produced raisins as early

as 1867, but it was not until 1873 that any quantity was placed on the market.

FIRST FRESNO VINEYARDS.

In the fall of 1873, Muscat vines were first brought to Fresno, when 25 acres of the Muscat of Alexandria were planted in the Eisen vineyard. In 1876-77 T. C. White planted the Raisina vineyard in the Central California Colony, Fresno, with Gordo Blanco Muscatels brought from Blowers' vineyard at Woodland. The following year Miss M. F. Austin planted her "Hedgerow" vineyard with the same variety, and Robert Barton also planted 25 acres of Muscat vines, but did not make raisins until later. The Butler vineyard, one of the largest, was first planted in 1879, while Colonel William Forsyth commenced grape growing in 1881-82. Most of his vineyard, however, was planted a year or two later.

PRODUCTION OF RAISINS DOUBLED IN FIVE YEARS.

Twenty-five years ago Fresno County commenced to take the lead, which it has kept increasing ever since, while southern California, especially Los Angeles and Orange counties, continued to fall off in their production, as illustrated by the following summary:

	1885.	1886.	1887.	1888.	1889.
Fresno	2,140,000	4,500,000	7,000,000	8,800,000	9,500,000
Riverside and San Bernardino	2,580,000	3,900,000	3,800,000	5,400,000	5,300,000
Los Angeles and Orange counties	2,780,000	3,600,000	1,700,000	840,000	160,000
Yolo	1,340,000	1,500,000	2,500,000	2,500,000	2,400,000
San Diego	200,000	500,000	400,000	800,000	150,000
Tulare	120,000	160,000	200,000	220,000	300,000
Kern					80,000
Other smaller districts	240,000	300,000	400,000	500,000	500,000
Totals	9,400,000	14,460,000	16,000,000	18,860,000	19,740,000

These figures are only an approximation.

Kings County does not appear in this list, as it was then part of Tulare County, not being organized into a separate county until 1893. Within the last twenty years great changes have taken place. Orange and Solano counties no longer produce raisins; Los Angeles County very few; Yolo County, which at one time produced Sultanas and Thompson's Seedless in considerable quantities, now finds it more profitable to ship them as table grapes; while the large vineyards in Riverside and San Bernardino counties are more devoted to wine grapes. Of the fifty-two counties in California, only ten produce raisins in any quantity:

TWELVE COUNTIES WHERE RAISINS ARE PRODUCED—(CROP OF 1909).

	Pounds.
Fresno	83,404,000
Tulare	20,000,000
Kings	18,000,000
Sutter	4,500,000
San Bernardino	3,600,000
San Diego	3,200,000
Madera	2,400,000
Yolo	2,000,000
Kern	1,100,000
Colusa	900,000
Los Angeles	600,000
Riverside	296,000
Total	140,000,000

With the view of presenting an impartial statement, every county (with two exceptions, where no statement can be obtained) has here been given the full amount of raisins it claims to have produced, which in some cases appear to be very liberal estimates. Butte County reported the production of 61,350 pounds last year, and Tehama County 14,000 pounds, but the amount is too small to be taken into account. A good crop in Fresno County is nearer 90,000,000 pounds than 83,000,000, or more than the other thirteen counties combined, and the proportion is between 64 and 70 per cent of the whole crop. Fresno County has only been credited with the balance of the crop and the total for the latter county is decidedly conservative. However, with such an overwhelming predominance, Fresno can well afford to be generous. These figures show that Fresno County now produces about sixty per cent of the raisin crop, or nearly double that of Spain, which has held the lead for centuries, the Fresno crop first being equal to the Spanish crop in 1892. In the early days Placer and Shasta counties produced raisins on a small scale. When raisins were first shipped east in any quantity, it is impossible to say. In 1875 New York reported that up to November 1st, 6,000 twenty-two pound boxes of California raisins had been received. About 1888 Fresno appears to have shipped a considerable quantity for the first time. In 1887 the market reports state that "Fresno raisins of excellent quality are now on the market, especially from the Butler and Forsyth vineyards." The large growers did their packing in those days. While comparatively a few years ago Colonel Forsyth, who was the leading pioneer in seeding raisins, then only in the experimental stage, first put seeded raisins on the market, it was with some difficulty that about 20 tons were disposed of, and no one then imagined the industry would grow to such large proportions. The Pacific Coast Seeded Raisin Company in Fresno can now turn out 300 tons a day, besides other small plants elsewhere. In the last fifteen years the output has increased from 700 tons to nearly 30,000 tons.

RAISIN GRAPE VARIETY.

For more than half a century many varieties of grapes have been brought into California from all the grape producing countries of the world. Coming from different countries they have many names. Some of these have been preserved, some lost, and others have received local appellations. The varieties of raisin grapes are few in number—the white Muscat of Alexandria, the Muscatel, Gordo Blanco—held the first

place; the White Malaga and Feher Szagos are used to a small extent; the seedless varieties are the Sultana (which is grown extensively near Smyrna in Asia Minor and was first brought to California by Colonel Agoston Haraszth in 1861), and Thompson Seedless, so named by the Sutter County Horticultural Society after W. Thompson, Sr., of Yuba City, who procured the cuttings in 1878 from Ellwanger & Barry of Rochester, New York. It was by them described as "a grape from Constantinople, named Lady Decoverly," and is now to be found in all parts of the State. Professor Bioletti of the University of California, and other high authorities, consider the variety identical with the Sultana but an improved variety. The growth of the raisin industry in California has been remarkable. Some thirty-six years ago the raisin crop was estimated to be worth only $4.000. For the first six years progress was slow. In 1879, the crop first exceeded one million pounds; in 1885 it amounted to over nine million pounds, and the following year jumped up to fourteen million pounds, and continued to increase steadily until it has reached the enormous total of 140,000,000 pounds.

THE PROBLEM OF MARKETING THE CROP.

The home trade of any country is always the most important and the most profitable, as it gives support to a greater quantity of productive labor in that country, and increases the value of its annual produce more than an equal capital employed in foreign trade. When the produce of any particular industry exceeds the demand of the country, the surplus must be sent abroad. Our exports of raisins, although not very large, have been increasing the last year or two, and now exceed the quantity imported.

In 1909 the export of raisins to different parts of the globe was:

	Pounds.
Europe	100.000
North America (Canada)	6,374,222
South America	32,253
Asia	201,756
Oceania (Australia and New Zealand)	1,165,954
Africa	5,896
Total	7,880,161

Canada is by far our best customer, consuming upwards of 5,700,000 pounds. New Zealand comes next with 1,100,000 pounds; Mexico, 177,000 pounds; and Japan, 105,000.

According to high authority, there are good times coming for California raisins and other fruit growers with the opening of the Panama Canal. The London *Times*, in a special article on this subject, recently published, says: "America will control the main trade of the southeastern Pacific after the completion of the Panama Canal. The center of gravitation of the commercial world will be changed. The effect of the canal upon the import trade of Australia and New Zealand will be that it will render those markets much more accessible to the manufacturing states of America, and will therefore make American competition more keen in these colonial markets than it is at present. But the most revolutionary change will result from the fact that California wines and fruits will be able to compete more successfully in European markets."

Efforts have been made in recent years to increase the consumption of raisins in the United States, and there is no reason why they should not prove successful, as there is ample room for a greatly extended use of this wholesome fruit. The United Kingdom consumes annually about 73,000,000 pounds of raisins and 142,000,000 pounds of currants, or a total of about 215,000,000, equal to five pounds per capita. In the United States, the consumption is less than one pound and a half per capita. In other words, if the American public appreciated raisins, as they have been for centuries in Europe, the acreage in raisin grapes might be more than doubled without causing overproduction.

In order to give stability to the raisin market, it must have powerful and well organized support behind it; in other words, some association or corporation to warehouse and hold the goods, only supplying the market according to the demand. Sooner or later it must come to some form of association or coöperation; it is the growers' only hope for paying prices. In recent years there has been a large carry-over from the old crop, which has to be disposed of early in the season, and the markets in consequence have been more or less demoralized. Another factor in the situation is that many growers, being in want of ready money, are in a hurry to sell at once, which still further helps to depress prices.

ADVERTISING AND PACKING.

In order to dispose of our raisins (or other fruits) much may be done through judicious advertising, but this is an art that requires men of experience to make it a success. During the last two years the Fresno County Chamber of Commerce has devoted a considerable amount of time and money to bring raisins to the notice of the public, by having a Raisin Day on April 30th, and by exhibits in the East and elsewhere. Another matter of the utmost importance is to insure that only good sound fruit is shipped, and that the packing, both as regards quality and weight, is in accordance with the description, for it is well worth while to study the requirements of your customers, especially those abroad. It is a common complaint in consular reports that this matter is seldom considered. If these points are attended to it may give you the key to new or larger markets, and make the open door open wider still.

We may well take notice of Canadian methods which have met with great success. A few years ago an act was passed, among other provisions, prohibiting the use of any designation such as "finest," "best," or "extra quality," unless the fruit was all sound, of one variety, properly packed, and unless not less than ninety per cent was entirely free from any defect. The faced or shown surface must be representative of the quality throughout the package.

Professor Edmund R. Lake of the Oregon State Agricultural College stated a few years ago "that the chief objection to the products of the Pacific coast is that it is not uniform in size, quality and pack, and that there is no certainty that an order placed and filled satisfactorily one year can be duplicated the next on a large scale."

In former years, raisins, especially in wet seasons or when they had been badly sanded, have been washed or "processed," and thus rendered so inferior that packers have not ventured to ship them under their

own brands. This is a short-sighted policy which causes untold damage to the raisin industry, and undoes the value of any amount of advertising. Under no circumstances should inferior or damaged raisins ever be packed; they should be sent to the distillery, fed to hogs and cattle, or even destroyed. In the early part of this year there were two convictions in the east under the pure food law, where the raisins were stated to be full of dirt and unfit for human food. Such cases inflict an immense amount of damage to the industry concerned.

Another drawback to a holdover crop is that raisins, unlike wine, do not improve by keeping; quite the contrary; we sometimes keep raisins too long, but dispose of the wine too soon. The best always pays the best. There is not a commodity in commerce in which some firm or brand does not take the lead of all others. You all know from experience that in food, drink, clothing, and articles of every description, there is always some name, or make, that commands the highest price. Why should this be so? The answer is that the majority of the public are always prepared to pay a higher price when they know that they can depend on obtaining the best. Another disadvantage the raisin industry labors under is having too many brands, and some of them with names that are the reverse of appropriate—and there is a great deal in a name. The Pacific Coast Seeded Raisin Company alone packs raisins for various firms, in upwards of 500 brands.

With regard to foreign trade, all descriptions should be printed in the language of the country for which they are intended; the extra cost would be small compared with the results which would be obtained. We all realize that cheaper transportation for small packages of merchandise would be of the greatest value in this country to producers and consumers alike. A large trade is carried on between the United Kingdom and British colonies, especially, by means of the parcels post. As an illustration, I may mention that a few weeks ago I sent a box of raisins to London. The raisins cost $1.75; the express charges amounted to $5.50. Such charges are prohibitory and destroy trade which might otherwise be obtained.

I am not here to-day to "boost" either Fresno County or the California raisin industry. "Boost" is an ugly word, and means in most cases exaggeration. It is far better to present facts and figures in a conservative manner, and allow those interested to draw their own conclusions. Any individual who has been led to expect too much by glowing reports, and finds the result much below his expectations, becomes the worst advertising medium in the world; it is far better to understate the prospects, and it pays to do so in the long run. To sum up, it may be safely predicted that good raisins, well packed, will always be in demand. That the raisin industry has a great future before it there can be little doubt, but to put it on a sound basis, there must be organization or coöperation, which is the only thing that will solve the difficulties which now confront this great industry.

COUNTRY LIFE.

By W. A. Beard, Member Country Life Commission.

The Commission on Country Life was created by former President Roosevelt in August, 1908, and charged with the duty of investigating and reporting to him the condition of country life in the United States. The members were Dr. Liberty Hyde Bailey, dean of the Agricultural College of Cornell University, Mr. Henry Wallace, editor of Wallace's Farmer," Dr. Kenyon L. Butterfield, president of Massachusetts Agricultural College, Mr. Walter H. Page, editor of "World's Work," and Mr. Gifford Pinchot. Later, the President appointed two additional members, Mr. Charles S. Barrett, president of the Farmers' Union of America, and myself.

The inquiry covered all states of the Union. It included a series of public hearings in various parts of the country, farmers' schoolhouse meetings, the results of which were forwarded to the Commission at Washington; a voluminous correspondence, including more than 100,000 replies to a set of questions propounded by the Commission and sent broadcast by the United States Department of Agriculture. The answers to questions were tabulated by the Census Bureau. In addition to these sources of information, detailed studies of assigned subjects were made by individual members of the Commission.

Nearly two years have now elapsed since the report of the Commission was placed in the hands of the President and by him transmitted to Congress. During this period there has been much discussion of the report, followed by organized action in many parts of the country substantially along the lines recommended. The inquiry has served to direct attention to a real need in the country life of the nation and there is in progress to-day a movement designed to meet this need.

Numerous state and interstate conventions have been held for the purpose of discussing country life deficiencies and remedies. Several states have country life commissions, several of the states of the Pacific Northwest have an interstate country life commission and an organized movement that is well advanced. All over this country there are manifestations of interest in the movement, one of the most important being the rapid advance in the development of agricultural education in the public schools and increasing interest in the redirection of the rural schools to the end that they may better serve the interests of the open country. Teachers' associations, as well as other bodies, are active in the movement to develop the latent possibilities of the open country as a place of permanent abode.

So much for the general situation: I shall now endeavor to define the condition which seems to call for remedy. No doubt many good people who have not given deep thought to this matter wonder what this

country life movement is all about. They know the farmers are prosperous, more prosperous than ever before, and fail to see where anything is particularly wrong when the farmers are making money faster than ever before in the history of farming in this country. The fact is, however, that prosperity is not the answer to the country life problem. On the contrary, it is often the largest factor in the development of the very conditions of which complaint is made.

Country life is less inviting and less satisfying than city life, and the country life problem is to develop in the country standards of living that approximate in all that goes to make life worth while, the standards of the town and city.

The problem is important because it is essential that there be maintained in this country a strong, virile, and distinctively American population. This fact was strongly emphasized by President Roosevelt in his message to Congress transmitting the report. He said: "We need the development of men in the open country who will be in the future as in the past, the stay and strength of the nation in time of war, and its guiding and controlling spirit in time of peace."

The fact that country life shows marked deficiencies as compared with city life will hardly be questioned. In order to bring the matter forcibly to your attention, however, I am going to ask you this question: Do you consider the country as attractive as the city as a place of permanent abode? Does your neighbor so consider it? Do your children and your neighbors' children so consider it?

Some of us who are fond of boasting of the manifold advantages of California may find it a trifle difficult to accept the statement that there are deficiencies in the country life of this State as well as in that of the older and less desirable commonwealths. Such deficiencies do exist, however, and we must not blind ourselves to the fact. Here, as elsewhere, the boys and girls reared in the country are leaving it for the city while alien people are taking over the land. Country life in California is undoubtedly more attractive than country life in many other states, but it is less attractive to those born on the soil than city life in California.

In the solution of the problem and the development of a new country life, California should take a leading part. In many respects the agricultural portions of this State present features of attractiveness that are not approached in any other state of the Union, and to this may be added the advantage of a productiveness equaled only in the tropical regions. We are assembled in the very heart of the great valley of California, destined to become the productive area on the American continent, and it would seem that here is the place to develop a rural civilization that will comprise the best the world knows, a country life that will be at once the most inviting, the most satisfying, and an example to country dwellers everywhere.

That this great valley and other agricultural sections of this State will be prosperous and populous is certain. We must not be content, however, with assurance of prosperity merely. The problems of country life must not be confounded with economic problems. The country life problem is of educational, social and other advantages, of suitable environment, of ideals; the economic problems are of dollars and cents.

It is true that a degree of prosperity is essential to the development of a satisfying life in either the city or the country, but prosperity alone is often a bar to the development of the best country life for the reason that the prosperous farmers move to town.

The movement to town impoverishes the country. It removes an important and valuable social element, and it removes the incentive to school and road improvement. It takes to the cities and towns the wealth produced upon the farms and aids in the development of superior advantages there.

In this State we have before us an era of settlement. The greater part of the tillable lands of California are undeveloped or only partially developed, and the resources of these lands are the principal basis of our expectations of increase in population and wealth in all that goes to make a great and prosperous commonwealth. Our country life in the fullest sense is yet to be developed and we are fortunate, therefore, in having called to our attention thus early the need of concerted and organized effort to develop in the country a community life approximating that of the cities.

I have come here to invite your attention to the opportunity which we of California have to lead in a work that means much to this State and more to the nation. The movement from the land to the city must be checked or reversed. The young men and the young women must be taught the value of the advantages which the country offers. They must learn that the prizes of life are available to them upon the farms and they must be interested in the development of the latent advantages of country living.

The time was when the farmer was the leader in the important affairs of this country, and the farmer is coming back. The business of farming is becoming more profitable every year, and will continue to do so because the land area can not be increased while the population must increase. The farm affords opportunities for self-development that are not usually found amid the rush and push of modern city life; it affords opportunity for study and reflection, and these must be the foundation of any real success in life.

We must not view this problem, however, from the standpoint of the welfare of the farmer only. We must consider his contribution to the welfare of the nation at large. A home owning population on the land is and must be the real foundation of the greatness of this republic. To the end that men may be content to remain on the land and rear their families there, country life must be developed to its highest possibilities.

This consideration should impress itself seriously upon us of California. Here we have an alien and unassimilable race that seeks to acquire land in this State and already enjoys a practical monopoly of at least one producing industry. We want neither alien ownership nor a system of landlordism, but a healthy, American and home owning rural population, and the way to assure this is to develop the capabilities of our delightful climatic conditions along lines already approached in some of the most advanced districts of the State.

The problem, both here and elsewhere, is largely of education, and the place to begin is with the educational system. The place to educate the young people to an appreciation of the opportunities which the

country offers is in the country schools. Our schools are not doing this. Our country schools are not seeking to inculcate country ideals or to develop country spirit, nor do they emphasize in any essential way the things of the country. In the country schools, as elsewhere, the tendency is toward the city and the things of the city are exalted.

All this is of interest to you, fruit growers of California. You represent the best intelligence engaged in the farming business and you can do much to further this movement in this State. I have no more interest in this than any other person in this room, and I have no appeal to make to you. I have stated the facts; your interest will suggest the action to be taken.

SQUIRREL ERADICATION.

By Surgeon Rupert Blue, United States Public Health and Marine Hospital Service.

The extermination of squirrels has become one of the serious problems of this State. The interest in the subject, prior to 1907, was almost wholly an economic and financial one. Since that date evidence has been collected which proves that this animal is responsible for the transmission of plague and the chief cause of its continuance in this country. As a result, the sanitarian has become interested in the natural history of the ground squirrel, and has joined hands with the economic interests in the war of extermination.

A statement of the annual losses due to these animals should not be necessary. The fruit growers are perhaps better informed on this subject than the general public, so I will mention only a few facts in this connection. In a recent paper Dr. Merriam, of the Biological Survey, stated that they inflict injury on all classes of crops, and rank among the most destructive of our native rodents. The amount of the annual loss to agriculture was given as $10,000,000.00. This we can readily believe in view of their wide distribution and great numbers on the Pacific coast.

REMEDIAL MEASURES.

The necessity for coöperation and organization in the work of squirrel destruction is fully appreciated. Without the assistance of the farmer, orchardist, and landowner generally, success will be impossible. With a view of securing the personal coöperation of property owners, a state-wide campaign of publicity and education has been inaugurated by the State health authorities. It is pointed out, in the literature issued, that the project should be taken up for the purpose of protecting the lives of the citizens and also to save the crops from destruction. The viewpoints of both the sanitarian and the agriculturist are thus considered.

A plan of campaign has been proposed which places the legal responsibility upon the shoulders of the county boards of supervisors. As they are the source of authority, all official work should be done with their consent and coöperation. It is the purpose of the health authorities, both Federal and State, to enforce the State law of March 13, 1909, called an "Act for the extermination of rodents." It is believed, however, that the landowner will willingly take up the work, in view of the benefits to be gained by destroying the pests.

The Federal Government, in aid of the State Health Board, has made a liberal appropriation, and will render further assistance by the detail of experienced medical officers whose time will be given wholly to the work. It is realized that the problem can not be solved in a year, or at any fixed time; therefore plans have been made to place the eradicative procedures on a permanent basis. With this object in view, a

thoroughly equipped camp will be established in the squirrel-infested region, where practical instruction will be given in field methods. Although designed primarily for the training of our own employees, this camp may be utilized by farmers and others who may desire such instruction. The expense of the camp will be charged against the Federal fund.

The full details of the plan of campaign may be obtained by writing to the Federal laboratory in San Francisco, or from the Secretary of the State Board of Health at Sacramento.

METHODS OF GROUND SQUIRREL EXTERMINATION.

One method, applicable during the wet season when the green grass is out, depends upon the use of liquid bisulphide of carbon, which is put in the holes. A second method depends upon the use of poisoned grain. A common method of applying bisulphide is as follows: From one to three days prior to the application of the poison all squirrel burrows in the area to be poisoned are well stopped with earth. The holes found open upon arrival of the poison squad will indicate to them the burrows containing squirrels. Two men working together can apply the poison most rapidly and economically. One man is provided with a supply of "waste," "sacking," or other absorbent material, divided into a number of small balls about half the size of the first. The bisulphide is carried in an ordinary one gallon oil can, and refilled from time to time from a supply kept in a cool place out of the sun. He is supplied with matches. His "pardner" carries a long-handled shovel. On arrival at on open burrow, a small ball of waste is saturated with two ounces of bisulphide, dropped deeply into the burrow and a match applied. After a moment's time the man with the shovel stops with earth this burrow, and all other burrows near from which the gas escapes. On subsequent inspection of the field all opened burrows will indicate holes lacking effective treatment.

During the dry season some form of grain poison with strychnine will probably serve the purpose best. A formula for the preparation of poisoned barley is as follows:

Whole barley	20 pounds
Starch paste	1 pint
Strychnine sulphate	1 ounce
Saccharine	1 dram

The barley is placed in a receptacle large enough to permit thorough stirring (as a wash tub). One pint of water is then brought to a boil and sufficient laundry starch (about two tablespoonfuls dissolved in a little cold water) is slowly added to form, when well cooked, a paste about the consistency of cream. The strychnine (first powdered, if in crystals) and the saccharine are now added to the hot starch paste, and the mixture well stirred until dissolved. While still hot this is poured over the barley, mixed well, and the whole put aside for several hours before using. This formula is recommended because of its simplicity, cheapness, and effectiveness. Scatter a teaspoonful along the squirrel trails or on hard bare places near the holes. The poison should *not* be placed in heaps on the soft mounds at the mouths of the holes. It will probably be found most efficient if scattered early in the morning, between the hours of three and seven o'clock.

AGRICULTURAL EDUCATION IN THE COMMON SCHOOLS.

By Edward Hyatt, State Superintendent of Schools.

This, I think, is a fact: that nearly every one to-day believes that our schools must become more closely allied to the industries by which our people live. More particularly, our California schools must be open to the genius of agriculture. Our gold will be exhausted; our oil will all be pumped out; our forests will be gathered to their fathers; all with a reckless haste and improvidence that we can not stay. But the soil will be more permanent. By its fruits California must always, in the large way, stand or fall. Our power and prosperity in the future depend upon the skill and the intelligence by which our people are able to practice the arts of agriculture and horticulture.

It is easy to agree that the schools shall take in agriculture. But it is tremendously difficult to find out just how this may be done. No one knows as yet. There must be myriad experiments and a thousand grotesque failures before we succeed. The casual observer does not dream of the difficulties and stumbling blocks in the way. It is the work of years to get a new idea really planted and growing in the set conservatism of a social institution like our school system. There is danger, when we professional educators take hold of a live and vital thing like agriculture, that we squeeze all the real live interest out of it in order to teach it in a conventional way. When it becomes embalmed in regular text-books, perfunctory recitations, and periodical examinations, it fails of its true mission. It does not get there. If it would truly succeed, ways must be found to keep it alive, to keep it in touch with country life, to invest it with the realities of extracting a living from the soil. And mark you this: the teachers of agriculture are not yet bred. Hundreds of years have been spent in growing good teachers of mathematics, literature, language—let us not run away with the notion that we can build up an agricultural Rome in a day. It is necessary to have some foundation for any kind of building. It is highly desirable to instill a spirit of sympathy for agriculture into the minds of all the people and to bring them into actual contact with the agricultural life. For many generations everything in education has tended away from the farm. The district school never does one thing in all its curriculum to prepare the boys and girls for a living on their fathers' farms. It always heads them rather toward clerkly or professional pursuits in the town or city.

Now the object of this paper is a very simple one, that may be tersely stated. It is to call attention to the fact and to emphasize it, that we must find something different from the traditional text-book method of approach if we would really get the genius of agriculture into the public schools; to name two or three methods of approach that are different, and to suggest that the best plan for a school to undertake agriculture is by finding ways to coöperate personally with the nearest agricultural industry, by actually entering into its spirit and its labors.

A movement has started in the prune orchards of the Santa Clara Valley that bears directly upon these educational questions. The idea

is to enlist the interest and the labor of the children and the people of the villages and towns in the harvesting of our perishable fruit crops, paying them full market wages for their work, furnishing them safe and attractive camping places, facilitating their coming and going, and giving them a season of healthful, active outdoor life. This is a practical course of study in California agriculture that may well command the coöperation of the educational forces of the State. The school term may very well begin and close so that the children and their parents can take part in the chief industry of the neighborhood. The curse of the fruit grower is the lack of labor in the gathering of his crop. This it is that brings the indigestible foreigners upon us, Japanese, Hindus, Chinese. This it is that is forcing much of our richest lands into the hands of aliens. The safety of our nation lies in having our land owned by our own people who earn their living from the soil.

It is a splendid thing to see the schools closed and the villages depopulated during the harvest season; to see the parents and the children living outdoors for a time and helping to pick the hops, gather the grapes, dry the peaches, take care of the prunes, apricots, tomatoes, and all that. It makes stronger, happier, wholesomer people. Everybody may well join in it. There is no loss of dignity in it. It advances the interests of California's great industry, the industry by which we must live for centuries into the future, with the world for a rival. It is truly educational, in the best and highest sense. It is worthy of remark that Homer Craig, an orchardist at Campbell, has been able in this way for the past three years to avoid the use of Asiatic labor. By making things agreeable and attractive for families to come to him for a summer outing, while working in the fruit, he finds that enough labor comes to him to harvest his crop; and this without any coöperation on the part of the school authorities. There is something in this work worth looking into.

The raising of a school garden is a most delightful and practical method of approach. Not all teachers have the knowledge and sympathy that make for the highest success, but nearly all come of ancestry that lived by the soil; and if their minds are open, their hearts willing, the old interests will come back. Not all rural schools are adapted to gardening, but many of the most successful school gardens are raised at the homes of the children.

There is no higher or more inspiring opportunity for a genuine teacher than to lead some children in the preparation and the planting of a piece of ground, be it large or small, and in the finding out about the plants and the insects that come of the venture day by day. There is no finer enterprise for a group of young people to engage in, under the inspiration of a genuine teacher, than to rent a bit of ground, to prepare it, plant it, care for it, market its product, keeping strict account of every step. That is experience; it is real life.

Most of the things we now teach would group themselves about it and grow out of it—arithmetic, bookkeeping, nature study and science. And let us remember that the thing does not even need to be a commercial success in order to be successful educationally. I take it that there is not a person within these walls who has succeeded with every job he tackled. Failure is as natural as success—probably more so. If the bugs get away with the crop—if neglect of a certain point cuts out the profit—if the season was unfavorable—if the frost came too

late—was the enterprise then destitute of value, and a fair mark for clumsy and thoughtless wit? By no means. It is real life, and it is doing the work it set out to do, no matter whether the actual returns were large or small.

It is the experience of other states that the most efficient approach to agriculture is by the organization of boys' and girls' agricultural clubs. These are formed for some specific and tangible purpose, as a competition under certain rules in the growing of wheat, or potatoes, or cotton, the raising of poultry or gardens, the baking of bread, the canning of fruit.

New York is the pioneer. Under the direction of Cornell University this state began work in 1898. It now has a membership of 75,000 boys and girls in its clubs, and has for its official organ the Cornell Rural School Leaflet, that goes to 7,000 teachers. Nebraska began this work in 1905, devoting its chief energy to the growing and the cooking of corn, under directions and recipes sent from the State University. In the fall they have local prize-winning contests in the township, then in the counties, and finally for the state, with a grand "corn banquet" bringing together 2,000 to 3,000 boys and girls from all over the commonwealth. The county superintendents of Winnebago County, Illinois, and Keokuk County, Iowa, have made national reputations in this work. Texas and Georgia are at it, too, and more than twenty other states.

An agricultural club may be organized in a single California school, and may do enthusiastic work. It is larger and better for the whole county to undertake it. Ambitious county superintendents of schools in the rural regions have an inspiring opportunity for usefulness in this field. There should be means provided for public displays of the results of competition. There should be some periodical to knit the organization together. There should be some leader who can travel about among the different clubs encouraging them and telling them what their fellows are doing.

Doubtless the time will come when the superintendents and teachers of agricultural counties will be chosen for enthusiasm and skill in this very kind of work. No superintendent in California has as yet taken it up. There is a fascinating field lying ready, a field for fame and glory, as well as for the highest service to the State.

Farmers' Bulletin No. 385 of the United States Department of Agriculture gives the latest and best information about the movement in a large way. The necessary leaders, the enthusiastic superintendents the essential periodical and all else that is needed will come—will come when the demand is strong enough to warrant it.

This, perhaps, sufficiently covers my theme. I have tried to say very distinctly that we have little to hope for in introducing so great and live a thing as agriculture to our boys and girls in the way we would do with a new grammar or a revised arithmetic. I have tried to remark very hopefully that in fostering such different things as school gardens, agricultural clubs, and taking part in the nearest industry, we shall be laying a foundation in the body politic for the structure in the schools that we would build. I shall try to come to a full stop by pledging you my best efforts during my life in the future to bring this thing about; for the reason that it seems to me the most important thing to-day for the schools of California to grasp.

IRRIGATION THE BASIS AND THE MEASURE OF THE PRESENT AGRICULTURAL GROWTH OF CALIFORNIA.

By Frank Adams, In Charge of Irrigation Investigations in California, Office of Experiment Stations, United States Department of Agriculture.

California is now undergoing the most rapid agricultural growth in her history. The dream of those who have seen all of the broad acres of the great valley yielding back to Nature full annual recompense for the rich endowment of soil and water and sunshine she has showered on this favored land is coming true. And the significant fact about this growth is that, in the aggregate, irrigation is both its basis and its measure.

During the past quarter of a century the increase in the area of cropped lands in California north of Tehachapi, which embraces the great bulk of the area of the State, has been relatively small. Yet the number of farms and the number of farmers have grown, especially during the past seven or eight years, in an almost unprecedented manner. One has not far to look to see that the beginning of this breaking up of the old grain estates of the seventies could could not have come about without water to make their diversified culture in 40 and 80-acre holdings possible. Neither does one fail to note that the magnificent agricultural increase south of Tehachapi during the past decade has also been due to irrigation.

To imply, however, that California is now experiencing a great agricultural awakening due to irrigation does not mean that rapid growth was not made and that wonderful things were not accomplished during the first half-century of the State's occupancy by Americans. No amount of pen-picture writing could minimize the achievements of California farmers or discolor the romance of California agriculture prior to 1900. Progress blazed its way to accomplishments that commanded the respect and admiration of people everywhere. Irrigation in the south made a garden of a desert. To the extent that it was absolutely necessary in the north, it accomplished the same result in a less degree, and where it was not absolutely necessary the grainfields and orchards and vineyards in many cases made their owners wealthy. But within ten years the northern farmers and landowners have come to understand that "sky farming" is not the best farming, even in northern California, and that the best success in agriculture can only come with the small intensely cultivated and irrigated farm.

THE IRRIGABLE AND IRRIGATED AREAS.

About 60 per cent of California is taken up with the high Sierra, Coast Range, and desert mountains, leaving 40 per cent, or about forty million acres below 3,500 feet elevation, devoted to the growth of agricultural products of one kind or other or to grazing. Of this great

area about fifteen million acres are valley lands and largely irrigable. Some of the higher mountain land is also irrigable, and quite a little of it is irrigated. In various irrigable sections of the State, the soil, moisture, temperature, and crop conditions are about as diverse as can be found anywhere in this country.

In the northeastern mountain valleys of Modoc, Lassen, and Plumas counties the elevation ranges from 4,000 to 5,000 feet and the climate resembles that of portions of the Rocky Mountains, with a short growing season and winter temperatures frequently below zero. The other extreme is Imperial Valley, at the southeastern corner, where the land lies lower than the sea, and temperatures are the highest to be found in the entire West. Despite these great differences, irrigation is as necessary to full production in the northern counties as at Imperial. The difference is merely in the degree of that necessity; at Imperial no beneficial growth whatever is possible without water, while in Modoc, Lassen, and Plumas counties irrigation makes at least two blades of alfalfa grow where only one blade grew before.

In the great interior valley, with ten million acres of irrigable land and less than one fifth of it irrigated, the relative necessity for irrigation to produce crops decreases from south to north, yet, following the same reasoning that is applied above to the northeastern and southeastern corners of the State, its absolute necessity for full production is as certain in the Sacramento as in the San Joaquin. And as already indicated, it is to the final appreciation of this truth that the present great agricultural development in California is due.

Along the coast and in the smaller interior valleys of the western side of the State, the amount of water it is necessary to apply artificially to keep the amount of moisture required by crops available in the soil when needed also decreases from south to north. Directly on the coast north of San Francisco no irrigation is now practiced. In Russian River, Sonoma, and Napa valleys, lying between the northern coast and Sacramento Valley, but little water is used, although those connected with the irrigation work of the Department of Agriculture believe that all that is available might be applied with much benefit, and experiments to demonstrate this are already under way.

In the coastal regions south of San Francisco neither the necessity for irrigation nor the extent to which the available water supply is applied increases very rapidly until San Luis Obispo is reached. In Santa Clara Valley, however, which is considerably north of San Luis Obispo, the time has long passed when orchardists expect a full yield without irrigation, and in San Benito and Monterey counties, also north of San Luis Obispo, the best farmers are the irrigation farmers. But it is in the southern coastal counties of Los Angeles, San Bernardino, Riverside, Imperial, Orange, and San Diego that most dependence is placed on irrigation water and the greatest wonders have been worked by its use.

THE IRRIGATION STORY TOLD BY THE POPULATION CENSUS.

In coöperation with the Office of Experiment Stations, the Bureau of the Census is now engaged in taking the irrigation census of California, simultaneously with the other states. When this census is complete and the results are published, just what part irrigation is playing in

the agricultural growth of California will be fully and accurately stated. Fortunately, however, we do not need to await the completion of this irrigation census to ascertain what that part is in a general way; it is already clear from the census of population recently announced for California by counties. Its brief but pointed story is this: outside of a few counties containing large urban, suburban, or transient populations, the high gains in population in California from 1900 to 1910 were all made in agricultural counties practicing irrigation.

Outside of Los Angeles County, which contains twenty-nine incorporated cities besides Los Angeles, the biggest gain made by any county was in Stanislaus. No more completely rural county than Stanislaus County is to be found in California, and there is no county, barring Imperial County, in which irrigation is more wholly responsible for growth than it is there. The increase was 136.7 per cent. The irrigated lands in this county are almost wholly in Modesto and Turlock irrigation districts, the latter, however, extending for a short distance into Merced County. In 1900 the approximate population in Modesto Irrigation District, which included the city of Modesto with 2024 people, was 3,000; in 1910 it was 7,500, or an increase of 150 per cent. The population in Turlock Irrigation District ten years ago was only 925; it is now 8,000, or more than eight and one half times the population in 1900.

In 1904 a canal was taken out of Feather River to irrigate eventually 80,000 to 200,000 acres of former dry-farmed grain land, largely in Butte County. There are now some 20,000 acres irrigated in Butte County by this canal alone, and this is not the only system that is supplying water for irrigation in this county that was not in existence ten years ago. The increase in the population of Butte County was 59.4 per cent. The increase in Fresno County was 99.5 per cent, in Kings County 64.4 per cent, in Merced County the same, in Orange County 74.8 per cent, in Riverside County 93.9 per cent, in San Bernardino County 103 per cent, in San Diego County 75.8 per cent in Tulare County 93.4 per cent. In all of these counties the irrigated areas have been largely increased since 1900, and in none of them could there have been nearly such large additions of population without such increase. In other counties, as for instance Glenn and Colusa, irrigation works not fairly under way when the population census was taken are already transforming old grain-farming villages into thriving modern towns.

So it is plain that where water is, people go, and that one who would be a part of the present rapid agricultural growth of California must be an irrigator, either to supply artificially all of the water his crops need, or to insure that there shall be no deficiency when rainfall fails to meet the natural demands.

WHAT IRRIGATION MEANS TO THE FARMER.

For ten years the Office of Experiment Stations of the United States Department of Agriculture, acting through its irrigation investigations, has been studying the needs of irrigators in California. Most of the time its work has been carried on in coöperation with the State of California, formerly through the State Board of Examiners, but recently through the Department of Engineering. During all of the time aid

has also been freely extended by the College of Agriculture of the University of California. The great extent of California and the varied conditions of its climate and soil and water have made difficult the choice of work to do, considering the limited funds available. The chief work accomplished has been in studies of water-right conditions and needs, duty of water, methods of preparing land for irrigation and of applying water, the determination and prevention of seepage, percolation, and evaporation losses in transit or in application, organization and management of irrigation enterprises and delivery of water to users, pumping for irrigation, and drainage of irrigated lands. Reports covering all of these subjects have been published from time to time and quite largely distributed among the farmers of the State. In addition, special studies of irrigation practice covering particular crops, and also special localities, have been made. Incidentally, something of an insight has been obtained into what irrigation means to the farmer and the extent to which he will sometimes go to obtain a water supply.

In the first place, because irrigation farming in California is as a rule very profitable, it must not be supposed that every irrigated farm in California pays. Irrigated farms in California are not unlike irrigated farms in other places. The irrigation farmer who is not both a good agriculturist and a good business man, who tries to work poor or water-logged land, to grow profitably unprofitable crops, or fails to use water economically, and in the quantity and the manner and at the time needed, is as apt to fail as would be a poor farmer on unirrigated land. In other words, irrigation is not a magical wand whose mere touch makes all land and all crops blossom into a bountiful harvest. It is but one of the many important agencies at the command of him who would make the best success out of farming, and the irrigation must be practiced both carefully and intelligently.

For the man or woman of moderate means it has long been conceded that the ideal crop with which to set up irrigation farming in the West is alfalfa, and with this crop irrigation usually means everything. Exceptions to this are found only on river bottoms and where the ground water level is high enough to carry moisture to the alfalfa roots by capillarity. How much money return a farmer can get from irrigated alfalfa depends on the length of the growing season, of course assuming favorable soil and water conditions. In the northeastern counties of California where the season is comparatively short it is usual to expect one good crop of about two tons per acre and pasture on the unirrigated bottom lands and two good crops and pasture when the land is watered. On the experimental irrigation plat maintained on the University farm at Davis under coöperative agreement between the Office of Experiment Stations and the University of California, six cuttings were taken from the land in 1900, yielding from 4.08 to 8.45 tons per acre, depending upon the amount of water received by irrigation. Irrigated alfalfa fed to dairy cows in Stanislaus County in 1919 raised that county from fourth to first in the list of dairy producing counties in California. In 1910, the second year after planting, a progressive farmer of Porterville harvested 950 tons of alfalfa from 145 acres of land, making the average yield substantially 6.5 tons per acre. At Pomona all alfalfa grown is irrigated with water pumped from depths of 30 to 100 feet and yields six or seven cuttings of from 1 to

1½ tons each per acre per year. In Imperial Valley irrigated alfalfa yields eight or nine cuttings of a ton to the cutting each year per acre.

The above are fair statements of what irrigation means to the alfalfa farmer in typical parts of the State. But while irrigated alfalfa is always a safe crop, whether sold as hay, as beef, as alfalfa seed, or as butter fat, alfalfa farming will not satisfy everybody as a permanent occupation. Fortunately, the range of crops whose profitable production proper irrigation makes certain in California is almost unlimited. While nearly all of these crops are profitably grown in one section or another of the State without irrigation, although few of them are so grown south of Tehachapi, the assurance the irrigation farmer has that the summer drought will not leave him without a harvest and the greater productiveness and diversity irrigation makes possible give to irrigation farming a stability that is exceeded in no other industry. Up to 1898 practically no orchards were irrigated in the Santa Clara Valley of Santa Clara County. When the Office of Experiment Stations in 1904 made an investigation of irrigation in that valley a majority of the orchardists were found to count on irrigation as they counted on cultivation. When the farmers of the lower San Joaquin and the Sacramento valleys commenced about six years ago to cease the old unprofitable summer-fallow grain farming, they saw their land commence to double and even quadruple in value as measured by the actual annual income from it. Ten years ago land in the thermal belt about Porterville and Lindsay that was not paying a fair interest on over $50 per acre when farmed to grain is now selling in bearing orange and lemon orchards for from $500 to $1,000 and more an acre, and the orchardists of that section have sunk a thousand wells from 100 to 200 feet deep to supply the water that has made their present culture possible. In 1900 Imperial Valley was an uninhabited desert. To-day, due to irrigation, it is doing some of the biggest agricultural things in the West. In the immediate vicinity of Pomona 250 pumping plants, some of them lifting water 400 feet, are in almost continuous operation many months each year supplying water from the various cienagas for the irrigation of orchards and alfalfa fields at an average annual cost of about $18; yet what irrigation means to the people about Pomona, as measured by the expense to which they will go to get it, is but what it means to thousands of others at Redlands, Riverside, San Diego, San Fernando, and the other attractive communities of the south. Even now the city of Los Angeles is preparing to supply water from its twenty-five million dollar Owens River aqueduct to 135,000 acres of land contiguous to the city, charging some such bonus as $50 per acre for the right to receive the water and $10 per acre per annum, which is considerably lower than the present prevailing rate, for its use.

There is no occasion, however, for multiplying examples of what irrigation means to the California farmer. The story is really as old as irrigation itself in this State, and has been told and retold almost each succeeding year. It may be interesting, however, to conclude with a brief statement of what an irrigated farm in California costs.

WHAT AN IRRIGATED FARM IN CALIFORNIA COSTS.

For the intending settler, unfamiliar with irrigation, it may be in place to say that while irrigation farming is not sufficiently different from other farming to require any extraordinary skill or means, failure sometimes results from both lack of acquaintance with irrigation practice and lack of means to apply to the knowledge possessed. To the settler anxious to learn, ample information as to the best way to proceed in the settlement of an irrigated farm is available in the experience of irrigators already on the ground, and in the practical bulletins of the United States Department of Agriculture and of the different state agricultural experiment stations. The Office of Experiment Stations of the Department of Agriculture, for instance, has already issued a bulletin containing practical information for beginners in irrigation, and a series of manuals covering the irrigation of the chief staple irrigated crops, all of which are given freely; also, specific inquiries addressed to the Department of Agriculture or the state experiment stations are always answered to the best ability of those receiving them. The cost of an irrigated farm and the amount needed to bring it to the point of supporting the farmer, which cost, by the way, is quite apt to be less than the cost of an unirrigated farm in some sections of the east, are, however, not always made duly clear.

In the first place, in addition to his land, which in its raw state may cost from nothing to $150, the settler must be secure in an ample water right. On the irrigation projects of the Reclamation Service, the water right is paid for in ten equal annual installments, and the land is either taken up under the government land laws or purchased from private holders. The installment plan of payment is also frequently adopted on private projects, but the water is usually sold with the land. In irrigation districts the water is part of the land and can not be sold separately. In the coöperative or mutual irrigation associations, which predominate in the south particularly, a share of stock in the water company carries a pro rata share of the water carried. Water aside from land costs from $10 in some sections of the north, where water is used chiefly for alfalfa or grain, to $200 an acre in the orange and lemon orchards of Riverside and San Diego, with annual maintenance and operation charges to be added, in some cases whether water is used or not. Land with water costs from a minimum of about $40 per acre in some of the mountain valleys to a usual maximum of about $250, depending both on the location and the cost of providing the water supply. Good land at $100 to $125 per acre, with a safe water right and under a well managed system, is perhaps a fair average for the irrigated lands being placed on the market in the interior valleys, although some land is being sold at double that figure. Even more important than the cost of a water right, however, an intending settler should satisfy himself by thorough investigation that the water right of the seller is clear and certain, that the quantity of water he provides is ample for the needs of crops and can be supplied, and finally, that the seller is financially responsible for and capable of living up to the contract he makes. If these matters are overlooked, irrigation by the newcomer may prove disastrous.

After purchasing his land and water the new settler is met with the practical questions of irrigation. First, he will need to prepare his land to receive water, which is neither a difficult nor an uncertain task. The practical bulletins already referred to will help him in this. But he must make provision for spending from $5 to $15 or $20 per acre, largely in his own labor, in doing this. The main thing is to be sure that the best method is chosen for conditions present, and then that the work is done well. Otherwise the annual loss due to improper preparation in the first instance will soon eat up the saving in the initial cost of a poor job. In addition to preparing his land to receive water, the settler will need to lay out his farm distributaries, the cost of which, however, is included in the figures above. This is a matter that should be carefully considered by irrigation companies selling land and water, although usually, and sometimes unfortunately, the settler is left to shift for himself in this regard. Here, again, the bulletins of the federal and state agricultural departments will be of service to those who seek their aid.

The costs of preparing land given above are for the usual conditions with unlined surface distributaries, yet it may not be amiss to state that orchardists about Pomona are in some cases spending as high as $100 per acre to prepare their land for planting, and throughout the citrus sections the usual practice is to use the more or less expensive underground distributaries.

Fortunately for the settler on irrigated land, the entire cost of an irrigated farm does not need to be met at the start. As the land and water are usually sold on installments, the main burden comes in providing the other accessories necessary. Few, if any, settlers expect to irrigate their entire holdings the first year, so that the cost of preparing some of the land for irrigation and the deferred payments on the land and water right can be met at first in part, and after a few years wholly from the income produced by the land. A settler, with a family who has less than $1,000 has little chance of making a fair success on most of the projects, although there can probably be found many instances in which success has been attained under such conditions. A modest start on a 40-acre tract to be devoted largely to alfalfa can usually be made with from $1,500 to $2,000 cash. Three thousand to four thousand dollars, however, should carry the enterprise through with fair comfort, although such an amount should not be counted on to provide a full equipment at the start. The agricultural manager of one of the largest land and irrigation companies now developing irrigated lands in California states that the average prospective settler of moderate means on a 40-acre tract under his project figures that about $6,600 is necessary to make the first payment of $600 on the land costing with water $125 an acre, provide a house costing $1,200, barn and outbuildings costing $600, horses, machinery, and other equipment costing $1,200, cows and other live stock costing $1,500, with $1,500 left for miscellaneous expenses. Yet it is fair to say that a farmer under this same project who started with only $1,000 cash recently received the prize for the best results obtained on a small irrigated farm.

AGRICULTURE IN CALIFORNIA.

The following article appeared in the San Francisco *Chronicle* of December 16, 1910, and as it bears so directly on the importance of sustaining the agricultural interests of the State, we deem it worthy a place in this report: "The discussion of the subject of state aid to agriculture, which was begun in the Commonwealth Club the other night, ought to lead, in the end, to very useful results. The preliminary discussion was based on a paper by A. J. Pillsbury, whose experience as the secretary of the State Board of Examiners had made him very familiar with what this State pays out in aid of agriculture, and what it gets for its expenditure.

It is significant of the absorption in the obvious, and the immediate, of even such excellent citizens as those who compose the Commonwealth Club, that the meeting of not more than fifty was much the smallest in recent years, and less than half the number which would have turned out to discuss an amendment to the charter of this city, and probably not a quarter so many as will be present next month to hear the flighty and irreverent of the membership make fun of their wise and sedate officials.

And yet the comparatively petty interests of this municipality are of the most trifling importance even to the inhabitants of this municipality as compared with deliberations which may affect the output of our soils, our mines, our forests, and our waters, without which San Francisco would be nothing, but a transfer point.

In all countries, and especially in the United States, public funds are used on a great scale in aid of farmers, as they are used in aid of no other class of people.

At bottom this is not because the community cares more about farmers than any other class of citizens, but because the existence of all other industries depends upon the exploitation of our natural resources, of which those of the soil are the most important and most essential.

It is not necessary to assume that the pressure of population, on subsistence, is already so pressing as to make State aid to agriculture imperative, lest some may starve. It is sufficient to realize that the greater the number of farmers and the greater the yield of the soils, the greater, and more prosperous, will be the cities whose inhabitants trade in those products.

There is a feeling, among some, that there has been waste in this State, connected with the expenditure of the sums appropriated in aid of agriculture. The object of the investigation, just begun, by the Commonwealth Club is to ascertain whether or not there is foundation for such belief, and if so, to suggest the remedy."

ALFALFA GROWING IN CALIFORNIA.

By Rev. D. Edmiston.

[This article is from a former report of the California State Agricultural Society, and is republished this year in deference to a constant and increasing demand for information on this subject.]

Were I called upon to express an opinion as to what single product of the soil would probably assume the greatest importance in our State within the next century, I would not hesitate to say alfalfa. As a forage plant for general use, as far as I know, it has no equal in value. This may be said not only in regard to its enormous productiveness, but as well in regard to its excellence as a feed, particularly for horses and cattle. For teams doing ordinary work on the farm, and for milch cows, it answers the purpose of both hay and grain. I feed no grain to my teams, and they not only stand work well, but they keep in good condition and in good flesh.

With our almost perpetual summer and with soil specially adapted to its growth, who can estimate the extent to which its production may be pushed in almost every part of our State? And who in imagination can look forward to the middle of the twentieth century and contemplate the vast number of profitable dairies, the fat beef cattle and fine horses raised on alfalfa, either in pastures or after made into hay, without pleasure and gratitude to the Bountiful Giver of so rich a heritage?

REQUIREMENTS.

But I am reminded that alfalfa can be successfully grown only where water for irrigation is abundant. However, there are occasional tracts of moist land where it does fairly well, though its cultivation on such land is attended with difficulties unknown on land which must be irrigated. The busy gopher works three hundred and sixty-five days in the year. And there are grasses, particularly Bermuda grass, which spread on such land with great rapidity and in a few years destroy the alfalfa. In making such large claims as to the extent and importance which alfalfa culture is destined to assume in the near future, I am met by the objection that the scarcity of water will for all time be an insuperable difficulty in the way. It is true that in many places water can only be obtained at great cost of capital and labor. Nevertheless, we can not doubt but that there are millions of acres of choice lands suitable for the purpose now lying waste which will be provided with water long before the middle of the twentieth century. It is only a question of capital and labor collecting and saving the enormous precipitation in our mountain districts. The rich valleys and plains extending from the southeast to the northwest in an unbroken chain for eight hundred miles were not planned by the Great Architect to remain forever waste. Whoever thinks so has studied the greatness of our State to little purpose.

SUITABLE LAND.

In southern California alfalfa will do fairly well on almost any land suitable for grain growing or orchard purposes where water can be secured in abundance for irrigation. And as a rule every farmer and orchardist who has such land will find it to his interests to grow a sufficiency for his teams and a cow or two. But it should be understood that there is a great difference in the adaptability of land, even in the same neighborhood, to alfalfa growing. And one who has chosen this industry as a prominent branch of his business should carefully select his location, as success or failure may hinge on the choice made. A porous subsoil which will take water freely can scarcely fail to give large crops if properly irrigated. There is ample fertility in almost any of our mesa lands to produce well if the roots can freely penetrate the subsoil. But there are tracts of land with fine surface soil which can not be made to produce heavy crops, simply because neither the water nor the roots can penetrate the underlying hardpan or tough clay subsoil. I have had some unpleasant experience in this direction, against which I would guard the inexperienced. In selecting land for this purpose one should not take surface appearances. He should dig down and find out what is under the surface, else he may be deceived.

PREPARING THE LAND.

Burn or remove all weeds and rubbish before plowing. If there are small mounds or hillocks which need to be removed with the scraper, it is much easier to do it before plowing the whole surface, as the low places, where the dirt should be dumped, may then be readily seen. And whatever leveling is needed should be done with reference to the location of the irrigating ditches. It is very important that the general lay of the land be accurately ascertained, either by a competent engineer or by the actual running of water. After the ground has been leveled as thoroughly as possible with the scraper, it should be well plowed and the surface carefully pulverized. All dead furrows should be filled and some suitable instrument used to make the surface level and smooth. A piece of square timber, twenty-five or thirty feet long, weighted down so as to make a load for two teams, one hitched at each end, and drawing it sidewise over the land, will level the surface as well or better than any other contrivance I have seen at work. And, as this is done rapidly, it is well to go over the land two or three times, changing the direction each time. This will put the ground in fine shape for irrigating, if the general level has been secured, and it will somewhat pack the loose ground and thus prevent the young alfalfa plants from drying out if the north wind should blow, and enable the roots more readily to fasten in the soil.

LAYING OFF FOR IRRIGATION.

For convenience and economy in irrigating, a ten-acre lot should be divided into three or four equal blocks. I have had considerable experience with five-acre blocks (twenty by forty rods); but I have always found them two wide for the equal and easy distribution of water. The water would stand over parts of the block longer than necessary before it could be forced over other parts. Consequently, the water is not equally distributed, some parts receiving more than is necessary and other parts not receiving enough.

AMOUNT OF SEED REQUIRED.

The amount of seed sown is not a matter of so great importance as the manner of sowing and covering. Nothing heavier than a horse rake, lightly run over the ground, should be used. A brush, or a considerable bunch of brush, fastened together, answers the purpose well. All that is wanted is to imbed the seed somewhat in the fine dirt on the immediate surface. It does not matter much if much of the seed remains in sight. Indeed, if the sowing is followed by a heavy rain or by flooding the ground, so as to insure a moist surface for four or five days, it is all right without any covering at all. Two years ago I sowed a block, and when about half of it was lightly covered a heavy rain drove us in. I never had a finer stand, the uncovered part being just as good as that which had been covered. Thus treated, ten pounds to the acre will make a very thick stand—even more than is needed. I once sowed ten pounds to the acre on one half a ten-acre tract and seven pounds per acre on the other half; and after it came up no one could have told the difference. It was all abundantly thick. Then, if you cover very lightly as above, or see that the ground is wet by rain or by flooding, ten pounds of seed per acre is the greatest plenty. But if one insists on covering with a heavy harrow, or an ordinary cultivator, as grain is covered, a heavy investment in seed will be required, as a very small part of the seed sown will ever send a plant to the surface.

CUTTING AND IRRIGATING.

After sowing and seeing that the ground is properly wet, nothing further will be required until the ground needs irrigation. But when the alfalfa gets six or eight inches high it should be mowed. This will check the weeds and cause the alfalfa to branch and to grow with much greater vigor than if left uncut. Through the first season the ground should have a good flooding after each cutting, and oftener if needed. It will grow all the faster if flooded once in every three or four weeks. If sown in the winter or early spring, the first season ought to make three or four tons per acre, if properly cared for. However, the first season's crop will vary greatly on different soils—much more than in following years.

MAKING HAY.

It will be well to begin cutting quite early in the spring, especially if one has a good deal to cut, but no definite date can be given, as the seasons vary greatly. It is a mistake to wait for the alfalfa to become large and show signs of blossoming. By cutting the early growth about the time the warm spring days begin to come, though it may make only a light crop, the new growth will start with vigor, and at the end of a month, when ready to cut again, you will probably have a ton per acre more than if the two cuttings had been thrown into one, and the hay will be of much better quality.

There is another important advantage in early cutting. Foxtail grass often spoils the first cutting of hay for horses. But if cut before the grass head begins to harden it is entirely harmless, as it will not fasten in a horse's mouth at this stage.

CONDITION AT CUTTING.

Throughout the season great care should be taken to cut promptly when the alfalfa has reached a proper state for making first-class hay. Of course, there are different opinions as to what the "proper state" is. I can only give my own opinion and the reason for it. And that opinion is that it should be cut before the stalk begins to harden, as it always does as the buds mature and the blossoms begin to open. If it stands longer, the quality of the hay deteriorates much more than the additional growth can compensate for. But there are those who want it to stand longer. They say that it makes better feed and has more substance in it. This is true, if woody substance is desired, but it is not true if nutriment is the object in view, if we may rely upon the tables and statements made in Farmers' Bulletin No. 31 of the United States Department of Agriculture. On page 18 it is said: "The percentage of nitrogenous compounds in the plant varies considerably, the maximum being in the early stages of its growth and the minimum about the time the seed commences to ripen. Hence, hay cut early, especially before the plant begins to bloom, is more nutritious than that cut after it has begun to bloom." The writer gives the analyses of hay made at four different periods in the growth of the plant, showing that the statements just made are correct from a scientific point of view. And I feel sure that experience will lead any careful observer to the same conclusions.

LOCAL EXPERIMENTS.

About two months ago, after feeding my cow for some time on hay which had been cut when in bloom, I changed to hay cut before it began to bloom, and at once her flow of milk increased at least one fourth. And my neighbor, Mr. H. D. Noland, tells me that in the same way the weight of milk given by his herd had been very greatly increased just as soon as changed from hay made in the ordinary way to that made from tender, young alfalfa. Another point in favor of early cutting is worth considering. Cows will then eat the stalks clean, wasting nothing. But if it stands until in bloom, when the stalks become woody, they can not be induced to eat them, often wasting one fourth of the weight. Hence, I am fully convinced that one making hay for his own use will find it decidedly to his advantage to cut before stalks begin to harden. And in making hay for sale it will be just as much advantage to his customers, and will be better all around, if they can be induced to pay a little more for such hay to make up for the loss in weight in cutting before it is fully grown.

SUGGESTIONS.

I would never cut at one time more than can be raked and put in cocks in the forenoon of the next day, if it is in the hot and dry summer months, or in the forenoon of the first day after it is sufficiently cured. However, the very early or very late cuttings, when the only difficulty is to get it dry enough to keep, may be handled in the afternoon without breaking the leaves and losing them. But through much of the season alfalfa hay should never be touched in the afternoon, or after the leaves begin to break.

One should never cut and put in the cock forty or fifty acres, as I have often seen done, before beginning to haul it in. Hay thus treated is scarcely worth more than half price, to say nothing of the delay of one week, or perhaps even two weeks, in irrigation which this method requires. One can not afford this loss. When I have sixty or seventy acres to handle, I generally cut about five acres in the morning and put in the cock the same amount cut before, and come as near as I can to hauling the hay from five acres each day. But I generally find it necessary to stop cutting a day or two each week to catch up with the hauling. When the weather is very dry and hot we think it pays to go to the field as soon as it is light, and lay off for the remainder of the day when the hay becomes too dry.

We find it a great convenience and economy of time and labor to have large and convenient racks on our hay wagons. We use flat racks, eight by sixteen feet. On one of these we can, without high pitching, conveniently put a load of two tons, and without any danger of its slipping off on sloping ground. A two-ton load on such a rack is about twelve feet wide and eighteen feet long, and no higher than a ton load on the kind of racks I often see used. And the average team can haul two tons on our hard roads easily, and it saves much time when one is hauling three or four miles.

ESTIMATING ALFALFA HAY IN STACK.

Age of stack.	Cubic feet for a ton.
30 days	8 feet cube, or 512 cubic feet.
6 months	7½ feet cube, or 422 cubic feet.
Old, fully settled	7 feet cube, or 343 cubic feet.

Sometimes in very large stacks or mows a 6 foot cube, of 216 cubic feet.

"There are different methods of measuring hay in the stack, depending upon the shape of the rick and also upon its size. With a long rick the usual method is to throw a line over the stack, measuring the distance in feet from the bottom of the stack on one side to the bottom of the other; add to this the average width of the stack in feet, divide this sum by four, which gives one side of the square—and multiply the quotient by itself and this product by the length of the stack in feet. This will give the number of cubic feet in the stack, which may be divided by 512, 422, or 343, as may be decided upon, in order to find the number of tons.

"For small, low ricks the rule is to subtract the width from the over, divide by two, multiply by the width and multiply the product by the length, dividing the result by the number of cubic feet in a ton.

"There is no established rule for measuring round stacks, but this one will approximate the contents of a stack of ordinary conical form: Find the circumference at or about the base or bulge at a height that will average the base from there to the ground; find the vertical height of the measured circumference from the ground and the slant height from the measured circumference to the top of the stack, taking all measurements in feet. Multiply the circumference by itself, divide by 100 and multiply by eight, then multiply the result by the height of the base, plus one third of the slant height of top. The hay in a round stack is usually less compact than in a rectangular rick, hence a greater number of feet should be allowed for a ton—with well settled hay, probably 512 cubic feet.

"The rules given may also be used in measuring any kind of hay, straw, cane or kaffir fodder, but with cane or kaffir only approximate results may be secured by stack measurements, because fodder is apt to vary greatly in weight according to the moisture it contains."

RESOURCES

OF THE

STATE OF CALIFORNIA.

(BY COUNTIES.)

ALAMEDA COUNTY.

Alameda County fronts on the bay of San Francisco for a distance of 38 miles, with an average width of 25 miles, extending to and beyond the summit of the Contra Costa hills, comprising numerous beautiful valleys, besides the broad Alameda Valley, which last is bounded by the waters of the bay on the one side and the Contra Costa hills on the other, and is one of the richest and most fertile valleys in the State. The principal stream is Alameda Creek. There are other creeks crossing the county and emptying into the bay, two of which furnish water for the city of Oakland. The country around Hayward is one of the great fruit-raising regions, many millions of pounds being shipped annually.

The soils immediately along the bay in Alameda Valley and the marshes formed by the overflow are heavy, but very fertile when reclaimed. Then comes a broad belt of rich, black adobe that is crossed by deposits of alluvium made by shifting channels of streams running down from the Coast Range. In the Niles region are lighter loams. About Livermore are uplands, bench, and valley lands. Between the latter two classes the variation in potash, lime, and phosphoric acid accounts for difference in grape crop. Mission San Jose is characterized by gravelly, upland, adobe soil, and was evidently chosen by the padres of the old Spanish mission for its exemption from frost, caused by its slight elevation above the surrounding valleys. The Pleasanton section consists of agricultural and grazing lands. The soil is a very rich sediment, producing hay, grain, potatoes, hops, and beets in abundance. At Alvarado the surrounding country is a fine farming and fruit region, and gardening and dairying are largely carried on. The fertile, alluvial soil is finely adapted to fruit-growing.

The average rainfall of the county is about 30 inches.

Alameda County was among the first to begin the planting of orchards and vineyards. The county is divisible into three sections—the cherry district, the apricot district, and the vineyard district.

From Oakland to Hayward is the home of the cherry, and in an ordinary year this crop is good for a profit of a quarter of a million dollars.

The apricot section includes all the region east and south of Hayward, but the center is at Niles. The Alameda apricot is high colored and the flavor exquisite. One of the most popular varieties, the Alameda Hemskirk, was originated here. The other varieties preferred are the Blenheim and the Moorpark. A first-class apricot orchard is easily worth $500 per acre, and some could not be bought for $750 or $800. Apricot trees yield from twelve to twenty tons per acre, worth from $20 to $30 a ton. Thousands of car loads of apricots are shipped annually from this county.

While cherries and apricots are the king and queen of fruits, there are others which do well, among them being the Bartlett pear. The

plum is another fruit which thrives, and the smaller fruits and berries are profitably grown.

In Alameda County are the largest currant patches in the United States. The size of an average currant farm varies from twenty to forty acres. Local canneries pack a great number of cases of this fruit, and thousands of chests of currants are shipped away each year.

Almonds, chestnuts, English walnuts, pecans, beechnuts, and hazelnuts are extensively cultivated.

Alameda is *par excellence* a vegetable-producing county. It has led in this industry for a long time, and the area devoted to vegetables has been increasing at a rapid rate, since the profit in peas, potatoes, tomatoes, rhubarb, asparagus, and several other vegetables is large enough to tempt the owners of the best soil to go into the business.

There are 8,000 acres devoted to vegetables in the county, not including sugar beets, which would add 4,000 or 5,000 acres more.

Many acres in this county are planted to tomatoes, which prove to be a most profitable crop. It is not unusual to find 100 acres of tomatoes growing upon a single farm.

The potato crop is of increasing importance, since it has been found that there is good money in the big Burbank potatoes and other commercial varieties. The best soil will produce from 75 to 80 sacks to the acre, although record yields of 150 sacks have been produced.

The growing of peas for canning has assumed importance. The output of the San Leandro cannery, located in this county, has reached as high as 1,200 cases per day, and 3½ tons of peas have been grown upon a single acre.

One of the prosperous agricultural industries is the growing of rhubarb for the California and Eastern markets.

California was the first State in the Union to manufacture beet-sugar on a commercial scale. In Alameda County it has been manufactured for the past thirty-three years. Within her borders is located not only the pioneer beet-sugar factory of this country, but also one of the largest factories in the world. The annual production of beet-sugar in California exceeds that of any other state. Beets in Alameda County average over 14 per cent sugar of 88 per cent purity, and they yield an average of 15½ tons to the acre. The planting season extends from the first of February to the middle of May. This provides a long period of activity for the factory, which begins operations in August, and has continuously maturing crops of beets to handle.

The average annual output of salt recovered from San Francisco Bay, in Alameda County, is 100,000 tons, including both coarse and fine salt.

Oakland is the county seat, located on the bay opposite San Francisco, and has for its immediate neighbors the cities of Berkeley and Alameda. These three cities are very prosperous and have a rapidly increasing population.

The University of California is located near the city of Berkeley, and has an average attendance of 4,500 students.

STATISTICS OF ALAMEDA COUNTY, 1909-10.

General Statistics.

Area 840 square miles, or 537,600 acres.	
Number of farms	2,482
Number of acres assessed	537,600
Value of country real estate	$13,228,625
Of improvements thereon	$3,164,225
Of city and town lots	$97,735,325
Of improvements thereon	$59,453,450
Of personal property	$21,715,497
Total value of all property	$200,206,102
Expended on roads, last fiscal year	$138,541
Expended for bridges, last fiscal year	$178,822
Number of miles of public roads	850
Road levy per $100, 1910	40c
Miles of street in town and city	450
Value of county buildings	$825,000
Railroads, steam — miles, 200; assessed value	$6,075,375
Railroads, electric — miles, 158; assessed value	$5,198,900
Electric power plants — 5; assessed value	$2,425,125
Electric power lines — miles, 100; assessed value	$200,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	1,350	2,083	$122,580
Barley	8,750	11,655	437,062
Oats	2,575	2,624	131,200
Corn	485	1,284	38,520
Total cereals	13,160	17,646	$729,362
	Acres.	Tons.	Value.
Alfalfa hay	710	3,895	$46,740
Grain hay	55,001	73,652	1,288,910
Grass hay	24,750	.....	12,375
Total hay	80,461	77,547	$1,348,025

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	15,750	12,225	27,975
Apricot	75,016	27,775	102,791
Cherry	28,935	5,975	34,910
Fig	300	250	550
Lemon	750	350	1,100
Olive	4,675	2,775	7,150
Orange	1,200	521	12,171
Peach	12,575	10,125	42,700
Pear	19,775	9,995	29,770
Plum	9,980	6,770	34,450
Prune	103,000	30,125	133,125
Quince	395	100	495
Total fruit	272,351	106 986	427,187
Almond	10,195	25,000	35,195
Chestnut	72	21	93
Walnut	6,175	28,125	34,300
Total nut	16,442	53,146	69,588
Grapevines	2,175	150	2,325
Berries, acres.	525	.....	525
Total	2,700	150	2,850

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	3,250,000	$812 500
Sweet wines	500,000	250,000
Beer (barrels)	200,000	2,400,000
Brandy	250,000	125,000
Vinegar	90,000	9,000
Carbonated and soda water	.....	551,115
Total		$4,147,615

Fish Industry.

	Value.
Oysters	$150,000

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	500,000	$17,500
Apricots	3,750,795	93,779
Asparagus	2,465,125	246,512
Blackberries, crates	900	3,250
Beans	475,985	23,799
Beets, tons	50,000	250,000
Cabbage	6,145,000	40,725
Carrots	8,125,000	162,502
Celery	7,892,000	789,200
Cauliflower	850,850	42,542
Corn	2,248,000	56,200
Cucumbers	824,800	16,496
Currants	125,125	6,256
Cherries	896,600	44,830
Figs	15,000	1,500
Gooseberries	30,000	1,500
Grapes	21,175,125	423,502
Lemons (boxes)	625	1,875
Loganberries	125,000	6,250
Onions	3,750,125	75,002
Oranges (boxes)	895	4,475
Olives	225,125	8,879
Pears	975,995	29,280
Peaches	500,000	15,000
Peas	3,975,725	198,786
Pumpkins (tons)	5,000	25,000
Plums	495,750	24,787
Irish potatoes	18,250,125	365,002
Sweet potatoes	2,900,800	145,040
Prunes	2,575,000	128,750
Quinces	3,765	188
Raspberries	1,125	5,625
Strawberries	750,000	37,500
Tomatoes	18,834,115	376,682
Rhubarb	2,222,275	133,336
Squash	882,000	22,050
Walnuts	202,995	20,299
Total		$3,843,899

Dried—	Pounds.	Value.
Almonds	305,555	$45,833
Apples	50,000	5,000
Apricots	500,000	25,000
Beans	295,750	7,872
Chestnuts	3,200	320
Onions	988,975	19,779
Pears	30,000	1,500
Peaches	200,000	20,000
Peas	145,625	14,562
Plums	375,225	37,522
Walnuts	45,965	7,166
Garlic	532,325	26,616
Vegetables in general.	.....	100,000
Vegetable seeds	.....	75,000
Total		$386.170

Canned—	Cases.	Value.
Fruit and vegetables of all kinds	957,595	$1,915,190

Dairy Industry.

	Production.	Value.
Fresh milk	8,125,275	$1,625.055
Butter (pounds)	3,012,750	903,825
Cheese (pounds)	8,115	1,623
Total		$2,530,503

Poultry and Eggs.

	Dozen.	Value.
Chickens	20,750	$124.500
Ducks	725	6.525
Geese	300	3 600
Turkeys	55,888	16.766
Eggs	1,675.125	753.706
Pigeons	1,500	5.400
Total		$910.497

STATISTICS OF ALAMEDA COUNTY, 1909-10—Continued.

Miscellaneous Products.

	Pounds.	Value.
Honey and hives	.....	$2,250
Nursery stock, flowers, plants, etc.	.....	500,000
Sugar beets (tons)	35,000	175,000
Total		$677,250

Live Stock Industry.

	Number.	Value.
Cattle—Beef	5,275	$211,000
Stock	13,000	390,000
Dairy Cows—Graded	10,125	455,625
Guernsey	12	
Herefords	110	
Holsteins	225	
Jersey	125	24,075
Polled Angus	1	
Red Polled	12	
Shorthorns	50	
Calves	8,725	52,350
Swine	5,164	67,132
Horses—Thoroughbred	1,150	230,000
Standard-bred	875	87,500
Common	25,975	1,948,125
Colts	9,995	499,750
Jacks and jennies	6	1,800
Mules	295	58,000
Sheep	15,000	90,000
Lambs	11,225	39,287
Angora goats	175	1,750
Common goats	225	1,125
Total		$4,157,519
Wool		226,000

Manufactories.

	Number of Employees.	Value of Products.
Bookbinderies, job printing and lithographing	680	$2,250,175
Paper boxes	75	151,775
Wood boxes	105	280,125
Borax	50	900,000
Brick	310	1,750,125
Brooms	95	75,000
Caskets	30	110,000
Carriages and wagons	75	275,125
Cotton, silk and jute	610	2,003,750
Cigars	75	500,000
Clothings and caps	700	3,000,000
Coffee, spices, etc.	145	450,150
Confectionery	585	1,755,550
Fertilizer	60	271,515
Bags, tents, and awnings	150	850,225
Electrical supplies	25	150,000
Flouring mills and health foods	805	1,277,775

Manufactories—Continued.

	Number of Employees.	Value of Products.
Drugs	50	$475,475
Drugs	50	475,475
Furniture	80	500,750
Inks	33	325,000
Jewelry and gold leaf	25	150,000
Leather goods and gloves	260	710,115
Lime	3	2,500
Output of foundries, including products of iron and steel industries	2,900	15,800,700
Malt	17	55,725
Matches	25	130,000
Meat products	610	
Hides		491,125
Lard		52,550
Meat packed		3,100,750
Tallow		35,115
Cocoanut and linseed oil	55	575,000
Olive oil	25	50,000
Paints and oils, etc.	302	1,885,850
Pickles and relishes, pickled olives	25	155,550
Iron pipe	15	50,000
Sewer pipe	150	750,000
Planing mills, sash and door factories	1,425	4,775,775
Potteries	49	501,115
Salt	200	500,795
Soap	50	300,000
Artificial stone, crushed rock, etc.	600	2,875,125
Wire	25	572,690
Knitted goods	100	511,115
Organs and pipes	6	105,000
Marble	7	50,000
Carbonic acid gas	50	205,000
Sal soda	10	132,000
Sugar, beet	230	700,000
Syrups and extracts	27	135,550
Spring beds	30	80,280
Tanneries	25	250,000
Rugs and carpets	45	101,975
Tin and galvanized iron	61	427,750
Willow and wooden ware	32	55,550
Store and office furniture	60	502,175
Patent roofing	49	510,125
High explosives and fuses	120	756,000
Rubber and waterproof goods	60	175,125
Yeast	9	31,115
Iron pyrites	8	35,000
Total	12,428	$55,636,755

Manufactured Output.

	Value.
Unsegregated output	$3,015,715

ALPINE COUNTY.

Alpine County is one of the unfortunate counties, as far as her means of communication with the other counties of the State is concerned, there being no public road maintained by her sister counties to her border, thereby rendering it necessary to turn to the state of Nevada for a route to safely reach the capital at Sacramento, or any other part of the State. This condition militates against the development of Alpine County's many natural resources, as intending investors or purchasers are not afforded a convenient route of reaching the county. This matter has been brought to the attention of many of the members of the present Legislature, and it is to be hoped that they will take some steps which will enable Alpine County to become a county of California commercially.

The resources of Alpine County are unlimited, especially in mineral, timber, and water power, the latter offering a field of immediate development to enterprising capital.

Ultimately Alpine County will be considered California's greatest summer recreation ground, which is yearly becoming more popular with those tourists who brave the poor conditions of the roads leading from the western slope.

STATISTICS OF ALPINE COUNTY, 1909-10.

General Statistics.

Expended on roads, last fiscal year, approximately	$2,000
Number of miles of public roads	110
Road levy per $100, 1910	35c

Dairy Industry.

	No.	Production.	Value.
Skimming stations.	23	59,000	$18,880

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,280	$51,000
Stock	3,200	64,000
Dairy Cows—Graded	400	1,600
Calves	350	4,200
Swine	600	3,600
Wool (pounds)	90,000	10,800

Most of the sheep that graze in the county are shorn in other counties.

Cereal Products and Hay.

	Acres.	Tons. (Tons of 2,000 pounds.)	Value.
Wheat	830	1,245	$12,330
Barley	70	135	3,800
Oats	100	150	4,000
Total value			$20,130
Alfalfa hay	650	2,000	$14,000
Grain hay	30	50	500
Grass hay	1,400	3,200	25,600

Poultry and Eggs.

	Dozen.	Value.
Chickens	6,000	$3,500
Eggs	21,000	5,250
Total value		$8,750

AMADOR COUNTY.

Amador adjoins El Dorado County on the south, Alpine on the west, Calaveras on the north, and Sacramento and San Joaquin counties on the east. It is inland and occupies the east central portion of the State. It has no navigable rivers. The Cosumne forms a part of its northern boundary and the Mokelumne forms its entire southern boundary. Both of the rivers are tributaries of the Sacramento. Varying, in the main, in altitude from 30 feet to 1,500 feet and in temperature from 30 degrees to 100 degrees Fahrenheit; having an average annual rainfall of 29 inches, and having land possessing every ingredient requisite in most productive soil, the county has never failed to produce a crop. There is no climatic condition of any portion of California, except the climate of the immediate seashore, but that may be found here. There is no product of any portion of the State but that may here be fostered. The greater portion of the county being a rolling or foothill region, is adapted to the cultivation of any kind of farm, of horticultural, or of viticultural product.

Grain, hay, spuds, the peach and the apple, and the raisin and the wine grape, can not be excelled elsewhere in flavor or in general appearance. In many parts of the western portion of the county, a great variety of vegetables is grown throughout the year.

Yielding (as the county does) an abundance of the best natural grasses, it offers inducements to stockmen, many of whom are awakening to a more full realization of the adaptability of this section to stockraising.

Distinctively the county is a region of mineral deposits. Besides what is used locally, two car loads and upwards of potter's clay and more than one car load of coal, are daily shipped from the county. We hope soon to have as large a shipment of fire brick. Silica is being shipped to outside markets. Other exports are lime rock, granite, marble, sandstone, greenstone, talc and copper.

The one resource, however, that is paramount, is gold from the quartz mines. Ten large quartz mines are at present operating on a most satisfactory basis. Our county is easily reached and is healthful. A miner here does not have to endure the cold of the Klondike nor the hardships of the Nevada mining districts. Everything is favorable to the operation of mines here. Well-constructed roads make the quartz zone accessible at any point. Wood and coal for fuel are at hand; fuel oil is brought by railroad immediately upon the great quartz zone—the famous "Mother Lode"—which traverses the county from southeast to northwest. Water supplied by canals leading from mountain lakes in the Sierra Nevada Mountains, is used for motive power and for irrigation and for domestic purposes as well.

Electric power is also available. The Pacific Gas and Electric Company of California has an electric plant located upon the Mokelumne River, six miles from Jackson, the county seat. This electric works has a capacity of 27,000 horsepower, which power can operate all of the machinery of Amador County for many years hence, and is at the same time sufficient for all other local purposes. Besides this, a large amount of power is supplied to the bay cities.

An estimate made from reports of cruisers, who have recently been over the timber belt, shows that there are in the county 10,000,000,000 feet of standing timber, most of which is sugar pine, yellow pine, spruce, fir, cedar, and different varieties of oak. Although not in such great abundance, there are many other kinds of timber.

The timber belt has from 1,000 feet to 4,000 feet greater altitude than the main mineral zone—the "Mother Lode"—which separates two regions of widely divergent interests. The resources of the western section are mill stuffs, products of the farm, the garden, etc., coal, pottery, fire brick, lime, and merchandise in general. The resources of the eastern region are lumber, round timber, lagging, shakes, shingles, charcoal, wood, marble, granite, talc, and mountain potatoes and apples that are unexcelled in appearance, flavor, and as keepers.

From these two sections solicitors, with their diversified products, come to the mines and towns along the "Mother Lode," which provide a ready market.

Amador ought to be a county of magnificent homes. Nowhere can more beautiful and inspiring landscapes, nor balmier skies, nor purer water, nor a more equable climate be found. Every kind of the best building material is right on the ground. The best architects and builders are available.

Our schools, as good as the best of the kind, capably supervised, are of the primary and grammar grades. There is also one union high school.

Manufacturing and kindred pursuits, are making encouraging headway. We are watching with great interest the progress being made by the fire brick plant at Ione. The potteries near Carbondale are placing their products on the market. The breweries of Jackson and Sutter Creek hold their own in the open market. The several wineries do a thriving business. Two ice plants are taxed to their utmost capacity. The Amador County Steam Laundry provides employment for a great many. The local machine shops and foundry recognize no superior. The door and sash factory at Sutter Creek supplies the local demand in its line. All kinds of stone dressing is most capably and artistically done.

Mountain lakes and valleys and river canyons furnish abundant opportunity for those needing recreation, or for those that enjoy huntings and fishing. Mineral springs having medicinal properties that are prescribed in certain cases, are found in different parts of the county.

It seems that nature could not have done more in the preparation of an inland county—even the seashore is becoming more and more accessible by the shortening of distance through rapid transportation. From the main quartz zone of the county, San Francisco may now be reached in eight hours. In time this distance will be covered in five

hours. Then San Franciscans will come in greater numbers to enjoy with us this land of sunshine, fruits, and flowers, of mineral wealth, and countless opportunities for profitable and safe investment.

STATISTICS OF AMADOR COUNTY, 1909-10.

General Statistics.

Area, 568 square miles.	
Number of farms	852
Number of acres assessed	370,924
Value of country real estate	$3,086,408
Of improvements thereon	$915,877
Of city and town lots	$301,240
Of improvements thereon	$737,376
Of personal property	$635,704
Total value of all property	$5,875,535
Expended on roads, last fiscal year	$22,000
Expended for bridges, last fiscal year	$7,500
Road levy per $100, 1910	30c
Railroads, steam—miles, 20; assessed value	$2,628,212
Electric power plants — 2; assessed value	$223,500
Electric power lines—miles, 52; assessed value	$30,000
Number of acres irrigated	6,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	4,000	1,500	$60,000
Barley	4,250	900	31,500
Oats	2,240	600	18,000
Corn	320	640	25,600
Total cereals	10,810	3,640	$135,100
Alfalfa hay	1,200	6,150	$92,250
Grain hay	4,200	9,040	132,720
Grass hay	1,200	1,200	13,200
Total hay	6,600	16,390	$238,170

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	11,350	1,300	12,650
Apricot	2,915	112	3,027
Cherry	2,959	126	3,079
Figs	.....	.....	1,250
Lemon	65	10	75
Nectarine	1,052	10	1,062
Olive	2,250	90	2,340
Orange	1,200	185	1,385
Peach	13,400	1,200	14,600
Pear	10,840	645	11,485
Plum	10,650	120	10,770
Prune	14,106	15	14,750
Quince	740	.....	755
Other kinds	125	.....	125
Total fruit	74,481	4,517	78,998
Almond	5,565	780	6,345
Chestnut	2,125	10	2,135
Pecan	25	.....	25
Walnut	1,260	200	1,460
Other nuts	10	.....	10
Total nut	8,985	990	9,975
Grapevines	371,560	36,000	407,560
Berries, acres.	40	.....	40

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	175,000	$4,375
Sweet wines	2,500	1,000
Beer (barrels)	5,400	43,200
Brandy	750	1,500
Cider	150	50
Vinegar	4,000	1,000

Number of wineries, 5; number of distilleries, 2; number of breweries, 2.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	429,540	$8,590
Apricots	406,000	8,120
Blackberries	6,000	500
Beans	14,000	650
Beets	13,000	260
Cabbage	22,000	440
Celery	3,500	350
Cauliflower	2,000	200
Corn	180,000	3,600
Currants	400	40
Cherries	.....	2,100
Figs	.....	1,250
Gooseberries	.....	20
Grapes	.....	814
Loganberries	600	60
Nectarines	25,500	1,300
Onions	120,000	2,400
Oranges (boxes)	50	150
Olives	26,000	1,600
Pears	390,700	8,000
Peaches	421,000	8,670
Peas	8,000	400
Persimmons	500	25
Plums	73,000	1,500
Irish potatoes	875,000	1,520
Sweet potatoes	1,000	20
Prunes	320,000	1,600
Quinces	19,000	410
Raspberries	750	190
Strawberries	4,000	600
Tomatoes	3,600	100
Totals	11,344,740	$154,955

Dried—	Pounds.	Value.
Almonds	4,000	$500
Apples	15,000	1,600
Beans	1,500	45
Chestnuts	12,500	1,525
Currants	1,500	150
Figs	1,000	60
Grapes	400	40
Nectarines	2,000	200
Onions	112,000	2,250
Pears	320,000	2,750
Peaches	27,000	2,200
Plums	360,000	3,200
Prunes	127,500	7,700
Raisins	1,200	95
Walnuts	125,000	1,500
Totals	386,100	$23,835

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	1	25	
Carriages and wagons	2	8	
Cement	..	25	$125,000
Cigars	1	2	500
Coal	3	20	100,000
Electrical supplies	1	2	5,000
Flouring mills	1	5	12,000
Foundries and iron works	2	25	65,000
Ice	3	10	75,000
Lime	1	20	10,000
Malt	2	10	23,000
Meat products	6	18	
Hides			12,863
Lard			3,640
Gold mines	16	2,700	

STATISTICS OF AMADOR COUNTY, 1909-10—Continued.

Poultry and Eggs.

	Dozen.	Value.
Chickens	3,600	$15,550
Ducks	40	240
Geese	20	240
Turkeys	100	2,500
Eggs	60,000	15.000
Total value		$33,480

Miscellaneous Products.

	Pounds.	Value.
Bees (hives)—Number	7	$9
Sorghum—Cane	730,000	1,825
Tobacco	500	50
Gold ore crushed	800,000	3,900

Live Stock Industry.

	Number.	Value.
Cattle—Beef	250	$5,000
Stock	11,000	132,000
Dairy Cows—Graded	2,300	4,600
Shorthorn bulls	8	160
Calves	1,200	6,000
Swine	1,400	5,600
Horses—Thoroughbred	6	4,000
Standard-bred	6	2,000
Common	2,200	9,900
Colts	250	6,250
Jacks and jennies	5	250
Mules	180	88,000
Sheep	2,000	4,000
Lambs	100	100
Common goats	700	1,400
Wool (pounds)	20,000	$24,000
Mohair (pounds)	100	2,000

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	70,400	
Cedar (acres)	400	
Pine (acres)	70,000	
Sawmills (number)	3	
Charcoal (sacks)	10,000	
Fuel, wood (cords)	8,000	
Lumber (feet)	320,000	
Piles	130,000	
Posts (pieces)	10,000	
Sash and door factories (number)	1	
Shakes (thousand)	50	
Shingles (thousand)	25	
Lagging, etc.	167,000	$11,775
Logs		110,000
Total value		$353,775

Power used for mills and manufactories in county—Steam (number), 14; electrical (number), 7; water (number), 7.

Manufactured Output.

	Quantity.
Clay	$35,000
Coal (tons)	16,000
Flour (barrels)	2,000
Lime (barrels)	10,000
Malt (tons)	375
Hides (pounds)	8,250
Lard (pounds)	23,000
Tallow (barrels)	100
Olive oil (gallons)	150

BUTTE COUNTY.

Butte County is situated in the northern and eastern Sacramento Valley, and embodies within its confines both mountain, foothill, and valley land. Its climate is most diverse, and in its confines are grown all the products to be found in the temperate and semi-tropical zones. The county has been fittingly described as a sample package of the United States. In the higher altitudes, apples thrive, while in the lower stretches of the rolling foothills, oranges, lemons, and olives reach perfection. On the broad plains great rice fields are now being planted, and this industry promises to rival that of alfalfa and dairy farming and the more extensive grain farming that has hitherto prevailed. Deciduous fruits of every kind are grown. In fact, there is hardly a product of the United States that in some part of Butte County can not be grown to a commercial extent.

The transportation facilities are unexcelled. This, however, is a comparatively new condition. The Western Pacific passes through the county. The Central and Southern Pacific also traverse it with main and branch lines. Its cities are also reached by the Northern Electric. The Butte County Railroad extends from Chico into the mountains as far as Stirling City, while the Butte and Plumas Railway is now building from Oroville into another rich mountain country.

The coming of transportation facilities has brought a great increase in the number of factories. The Diamond Match Company has the largest lumbering establishment on the Pacific Coast in this county, the main mills being located at Chico and Stirling City. The Truckee Lumber Company has just completed a large mill at Oroville. The Swayne Lumber Company has also built a large mill in the mountains east of Oroville, on the Western Pacific. The timber industry here has accordingly assumed mammoth proportions.

The largest olive pickling works in the United States are located in Oroville. A large number of smaller mills, and olive oil works are also located in the same field. There are also a number of orange packing houses, and many drying yards and canneries.

The manufacture of electric power has also assumed a large place. The largest producer is the Great Western Power Company, whose plant upon the Feather River is the largest in the United States. The Pacific Gas and Electric Company has also large plants here, and the Oro Water, Light and Power Company is also a big producer. Other power plants are in contemplation. Civil engineers have stated that the watershed of the Feather River contains more potential power than the anthracite coal fields of Pennsylvania.

The county is exceptionally well watered. Through it runs the Feather River with a large number of tributary streams. On one boundary is the great Sacramento River. As a result of the abundance of water, increased attention is being given to irrigation. The Butte

County Canal covers thousands of acres around Gridley, where the utmost prosperity prevails. Other companies are establishing themselves, both in the valley and on the rolling foothill lands.

Educational facilities are unexcelled. There are three high schools in the county, all accredited at the University of California. At Chico is located a State normal school.

The county is now at the beginning of a great forward movement and optimism prevails everywhere. The reason for the faith of the people in their county is to be found in the fact that the productivity of the land assures increased values to the land, while the faith with which capital regards the county can be seen in the tremendous investments made here.

The stamp of approval has been placed upon the lands of Butte County by the experts of the United States Government. After searching the United States over, lands near Chico were selected for the establishment of the United States Plant Introduction Gardens, and there the chief experimental work conducted by the United States is being carried forward to-day.

Butte County is also the largest gold-producing county of the State. The chief gold-dredging field in the world lies around Oroville, and millions are invested in the industry. An increasing investment in quartz and gravel properties is also being made.

STATISTICS OF BUTTE COUNTY, 1909-10.

General Statistics.

Area 1,727 square miles, or 1,105,280 acres.	
Number of farms	2,480
Number of acres assessed	900,511
Value of country real estate	$10,688,130
Of improvements thereon	$2,475,190
Of city and town lots	$1,193,525
Of improvements thereon	$2,118,905
Of personal property	$3,709,479
Total value of all property	$20,185,225
Expended on roads, last fiscal year	$66,243
Expended for bridges, last fiscal year	$113,868
Number of miles of public roads	1,710
Road levy per $100, 1910	40c
Value of county buildings	$262,000
Irrigating ditches, miles, 296; cost	$93,567
Railroads, steam—miles, 160.42; assessed value	$2,500,896
Railroads, electric—miles, 50.36; assessed value	$25,807
Electric power plants — 4; assessed value	$1,408,287
Electric power lines — miles, 157.01; assessed value	$90,853
Number of acres irrigated	18,500

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	44,642	908,333	$735,749
Barley	49,792	1,347,365	606,314
Oats	3,906	143,800	57,520
Corn	396	15,421	12,550
Total cereals	98,736	2,414,919	$1,412,133

	Acres.	Tons.	Value.
Alfalfa hay	13,138	59,678	$341,685
Grain hay	57,442	53,795	430,460
Grass hay	1,329	1,721	8,605
Total hay	71,929	115,194	$780,750

Fish Industry.

	Pounds.	Value.
Salmon	104,253	$6,255

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	37,050	17,543	54,593
Apricot	12,964	796	13,760
Cherry	5,697	3,317	9,014
Fig	12,627	2,560	15,187
Lemon	7,027	355	7,382
Nectarine	919	26	945
Olive	67,571	10,563	78,134
Orange	178,611	19,811	198,422
Peach	277,825	66,380	344,205
Pear	21,943	6,315	28,258
Plum	12,968	2,068	15,036
Prune	142,435	38,079	180,514
Quince	669	49	718
Other kinds	2,000	1,250	3,250
Total fruit	780,306	169,110	949,418
Almond	93,336	26,159	119,495
Chestnut	565	50	615
Pecan	135	60	195
Walnut	3,470	1,905	5,375
Total nut	97,506	28,174	125,680
Grapevines	211,534	20,375	231,909
Berries, acres.	233	25	258

Poultry and Eggs.

	Dozen.	Value.
Chickens	11,904	$71,424
Ducks	89	534
Geese	41	545
Turkeys	1,798	53,940
Eggs	470,250	117,560
Total value		$244,003

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	1,310	$3,930
Beeswax	950	250
Honey	20,985	2,098
Hops	247,000	32,110
Alfalfa seed	4,800	850
Grass seed	13,000	1,300
Sorghum, cane	136,475	250
Syrup (gallons)	285	142
Sugar beets (tons)	56,515	240,000
Rice	437,500	17,400

STATISTICS OF BUTTE COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	3,392,695	$33,926
Apricots	117,970	1,180
Asparagus	23,200	1,160
Blackberries	238,350	11,920
Beans	163,025	7,500
Beets	53,250	795
Cabbage	125,000	1,875
Celery	28,190	845
Cauliflower	11,435	575
Corn	180,760	3,420
Currants	750	65
Cherries	204,860	10,243
Figs	100,500	2,010
Gooseberries	2,750	275
Grapes	1,063,500	8,000
Grape fruit (boxes)	890	2,790
Lemons (boxes)	2,193	6,571
Loganberries	81,350	3,254
Nectarines	92,500	925
Onions	17,150	5,715
Oranges (boxes)	203,890	305,835
Olives	1,670,000	41,750
Pears	1,051,000	21,500
Peaches	10,022,000	100,200
Peas	24,000	750
Persimmons	9,500	760
Plums	1,762,400	17,625
Irish potatoes	1,809,000	18,090
Sweet potatoes	231,000	3,365
Prunes	9,600	970
Quinces	22,000	450
Raspberries	24,600	2,460
Strawberries	93,500	4,675
Tomatoes	565,000	5,650
Turnips	36,000	360
Rhubarb	5,000	250
Pumpkins (tons)	2,266	4,530
Totals	24,441,074	$611,944

Dried—	Pounds.	Value.
Almonds	685,000	$98,050
Apples	5,000	2,500
Apricots	70,500	7,500
Beans	7,000	2,800
Chestnuts	5,900	5,900
Figs	459,000	13,750
Grapes	4,000	80
Nectarines	2,500	150
Onions	344,000	3,450
Pears	55,000	4,400
Peaches	4,168,000	208,425
Peanuts	2,000	100
Plums	46,900	2,815
Prunes	3,004,500	150,225
Raisins	75,000	3,000
Walnuts	21,000	2,625
Totals	8,955,300	$505,770

Canned—	Cases.	Value.
Blackberries	100	$250
Pears	400	1,000
Peaches	40,500	101,250
Tomatoes	500	1,250
Totals	41,500	$103,750

Manufactured Output.

	Quantity.
Brick	100,000
Cigars	250,000
Flour (barrels)	25,000
Hides (pounds)	512,000
Lard (pounds)	98,300
Meat packed (pounds)	15,000
Tallow (barrels)	600
Olive oil (gallons)	56,975
Pickled olives	97,400

Live Stock Industry.

	Number.	Value.
Cattle—Beef	19,625	$785,000
Stock	13,160	315,840
Dairy Cows—Graded	3,761	188,050
Thoroughbred—		
Holsteins	25	1,500
Shorthorns(calves)	3,994	39,940
Calves	40,565	1,330,330
Swine	14,874	917,000
Horses—Thoroughbred	12	15,000
Standard-bred	168	33,600
Common	8,926	624,820
Colts	1,073	37,555
Jacks and jennies	17	4,700
Mules	1,557	233,550
Sheep	81,570	244,710
Lambs	8,300	18,600
Angora goats	1,325	5,300
Common goats	950	2,750
Total stock	159,337	$3,467,915
Wool (pounds)	695,500	97,370
Mohair (pounds)	12,000	2,400

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	350,000	
Cedar (acres)	35,000	
Pine (acres)	140,000	
Fir (acres)	175,000	
Sawmills (number)	8	
Fuel, wood (cords)	15,700	$58,380
Laths (thousand)	519 000	2,765
Lumber (feet)	63,000,000	1,221,500
Posts (pieces)	19,000	1,900
Railroad ties (pieces)	40,000	10,000
Sash and door factories (number)	1	75,000
Shakes	359,000	3,590
Shingles	800,000	20,000
Total value		$1,393,135

Power used for mills and manufactories in county—Steam (number), 14; electrical (number), 13; water (number), 5.

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	1	50	$150,000
Cigars	2	4	4,800
Confectionery	2	6	7,800
Flouring mills	2	15	255,000
Foundries and iron works	..	.....	252,000
Matches	1	40	150,000
Meat products	16	85	
Hides			46,800
Lard			11,796
Meat packed			2,700
Tallow			10,800
Olive oil and pickled olives	13	113	
Planing mills	4	92	450,000
Granite	1	7	30,000

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	2,500	$1,000
Sweet wines	2,611	1,044
Cider	2,000	1,000
Vinegar	205,000	30,750

Number of wineries, 2.

Dairy Industry.

	No.	Production.	Value.
Creameries	2		
Skimming stations.	15		
Butter (pounds)		366,485	$109,945

COLUSA COUNTY.

Colusa County is situated in the heart of the great Sacramento Valley. The transportation facilities are the Southern Pacific Railroad, bisecting the county from north to south, the Colusa and Lake Railroad, running from Colusa westwardly to Sites, and the navigable Sacramento River.

The fertile soil, the temperate climate, the extreme dryness of the atmosphere during two thirds of the year, and lastly, a sufficient rainfall, make possible the production of great wealth from the fertile acres of this county. The present tendency is the disintegration of the large farms and a settling up of the county with small holdings. Several millions of dollars have recently been invested by land companies, who will induce people from other places to settle upon lands purchased by them in this county. Large irrigation ditches are being constructed that will tap thousands of acres of land which by the assistance of water will be able to produce many fold more than is now produced. Everything gives promise that the population, that the irrigated portion of our land area, and the value of our lands, will more than treble during the next five years.

The system of schools throughout the county is very efficient, and although the county is large, the schools are conveniently located and within reach of those desiring education.

Colusa is the principal town and county seat of the county. Its population, including two additions, is about 2,500 inhabitants. It has a primary, grammar, and high public schools, besides a convent. The town owns its own public library, municipal water works system and sewer system, all recently installed.

The western portion of the county is principally mountainous, with some very productive valleys intervening. Cattle and live stock interests prevail. Several famous mineral resorts are located in this portion of the county, and thousands of bottles of mineral water are shipped to every point of note on the Pacific coast. In a small way some gold and quicksilver mining is maintained at Sulphur Creek, while at Sites two quarries take out stone, known as the famous Colusa sandstone, from which many prominent buildings in San Francisco are built.

STATISTICS OF COLUSA COUNTY, 1909-10.

General Statistics.	
Area, 691,200 acres.	
Number of farms	823
Number of acres assessed	585,179
Value of country real estate	$9,215,445
Of improvements thereon	$1,275,440
Of city and town lots	$404,600
Of improvements thereon	$509,140
Of personal property	$1,506,714
Total value of all property	$12,992,538
Expended on roads, last fiscal year	$39,527

General Statistics—Continued.	
Expended for bridges, last fiscal year	$16,398
Number of miles of public roads	1,225
Road levy per $100, 1910	40c
Value of county buildings	$100,000
Irrigating ditches, cost	$4,445
Railroads, steam — miles, 56; assessed value	$828,126
Electric power plants, 1; electric power lines (miles), 16; assessed value	$9,580
Number of acres irrigated	2,400

STATISTICS OF COLUSA COUNTY, 1909-10—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	8,125	.....	8,125
Apricot	18,870	500	19,370
Cherry	2,475	.....	2,475
Fig	4,450	1,800	6,250
Lemon	900	100	1,000
Olive	6,600	100	6,700
Orange	9,500	500	10,000
Peach	13,000	.....	13,000
Pear	3,700	.....	3,700
Prune	85,000	5,800	90,800
Quince	130	30	160
Other kinds	250	.....	250
Total fruit	153,000	8,830	161,830
Almond	25,600	5,000	30,600
Walnut	3,800	900	4,700
Total nut	29,400	5,900	35,300
Grapevines (all kinds)			92,000
Berries, acres (all kinds)			75

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,500	$45,000
Stock	17,200	244,000
Dairy Cows—Graded	.....	100,000
Calves	4,802	48,020
Swine	21,540	175,000
Horses—Thoroughbred	8	4,000
Common	4,700	235,000
Colts	1,100	22,000
Jacks and jennies	69	5,000
Mules	5,844	600,620
Sheep	80,000	320,000
Lambs	52,000	104,000
Angora goats	3,500	17,500
Total stock	194,763	$1,920,140
Wool (pounds)	756,000	150,000
Mohair (pounds)	13,500	2,600

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	21,200	18,566	$519,848
Barley	180,000	108,803	2,176,000
Oats	500	425	13,000
Corn	1,400	1,200	42,000
Total cereals	203,100	132,774	$2,750,848
Alfalfa hay		36,000	228,000
Grain hay		60,798	480,000
Total hay		96,798	$708,000

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	4,000	$5,000
Cider	1,600	1,800

Fish Industry.

	Pounds.	Value.
Bass	15,000	$1,500

Dairy Industry.

	Production.	Value.
Creameries	.....	$2,500
Butter (pounds)	502,000	200,000

Manufactured Output.

	Quantity.
Flour (barrels)	15,000
Hides (pounds)	90,000
Lard (pounds)	68,230
Tallow (barrels)	63,400

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	40,000	$800
Blackberries	3,500	150
Beans	4,000	80
Beets	3,500	85
Cabbage	50,000	800
Celery	25,000	510
Cauliflower	15,000	225
Corn	29,000	400
Figs	35,000	380
Grapes	125,000	1,500
Grape fruit	4,000	250
Lemons (boxes)	250	500
Loganberries	3,000	250
Onions	42,000	220
Oranges (boxes)	5,000	11,250
Olives	25,000	
Pears	50,000	1,250
Peaches	12,500	250
Peas	15,000	150
Irish potatoes	.....	3,900
Sweet potatoes	22,000	250
Tomatoes	400,000	500
Totals	1,823,500	$23,700

Dried—	Pounds.	Value.
Almonds	140,000	$14,000
Apricots	32,000	2,420
Beans	1,432,000	44,960
Figs	50,000	2,500
Peaches	16,000	900
Prunes	1,500,000	47,000
Raisins	850,000	28,000
Walnuts	8,000	800
Silver prunes	30,000	1,250
Totals	4,058,000	$141,830

Forest Products.

	Amount.	Value.
Sawmills (number)	1	$3,000
Fuel, wood (cords)	900	7,200
Total value		$10,200

Power used for mills and manufactories in county—Steam (number), 1; electrical (number), 3; 1 sawmill, 1 flourmill, 2 planing mills.

Poultry and Eggs.

	Dozen.	Value.
Chickens	3,504	$20,024
Ducks	40	240
Geese	15	120
Turkeys	1,350	25,000
Eggs	125,000	31,250
Total value		$76,634

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	800	$1,600
Broomcorn brush	310,000	15,000
Honey	190,000	1,900
Alfalfa seed	180,000	27,000
Broomcorn seed	350,000	22,540
Dressed poultry	150,000	10,500
Wild game	75,000	4,000

Manufactories.

	No	Number of Employees.	Value of Products.
Flouring mills	1	5	$120,500
Sandstone	2	20	75,000

CONTRA COSTA COUNTY.

Contra Costa is one of the central counties, its shore line being within 14 miles of San Francisco. It possesses unusually good traveling facilities, both by rail and by steamer. The county has 70 miles of water front, nearly all of which is upon deep water, navigable by all vessels engaged in commerce. Over three fourths of its area is cultivated, the balance being used for grazing. The only mountain of any size is Mount Diablo, which is 3,896 feet in height, and almost in the geographical center of the county.

About two thirds of the area is rolling and hilly. Lying between the hills are some of the most fertile and beautiful valleys in the State, which are drained and watered by many streams, the banks of which are bordered by oak, sycamore, laurel, willow, etc., while the hills are dotted with oaks, many of which are of large size.

The farming lands in the eastern section are between the foothills and the San Joaquin River. The soil is of a rich alluvial nature, and produces wheat, barley, alfalfa, fruit, and vines. To the northward and between the uplands and the San Joaquin River is a body of tule lands, a large portion of which has been reclaimed, and is some of the most productive land in the State, being a rich deposit of sediment and decomposed vegetation. Alfalfa, asparagus, potatoes, beans, etc., are produced on the largest scale on such lands, the asparagus being shipped East by the car load during the early spring.

The average rainfall is from 18 to 23 inches, which is ample for all purposes of agriculture, horticulture, etc.

In depth, the soil throughout the county shows a remarkable continuity of rich alluvial deposits underlaid by limestone or clay. There is an occasional change to a coarse sandy and gravelly heavy loam of black or brown tint. It has great power for enduring drought, and is easy to work, giving large returns. The soil in the uplands is in character similar to that of the lowlands, and being drier, is for some purposes even better.

Irrigation is not required to insure crops; the abundant rainfall, the absence of evaporating heat, and the moisture-laden breezes from the ocean furnish abundant humidity for all forms of vegetable life without recourse to artificial irrigation.

The many beautiful valleys and the rolling hills are strikingly similar in general characteristics to the gentle slopes of sunny France. Scattered in all directions are numerous small vineyards and orchards that produce rich results. Fruit growing has proved successful and remunerative.

Grain raising is very prominent in this county. A very large acreage is planted to wheat, oats, barley, and hay.

The raising of sugar beets is a growing industry.

Vegetables of all kinds are raised very profitably and on a large scale; one very large tract of land is used entirely for the propagation of

asparagus for early Eastern shipment. Potatoes, beans, etc., are a prolific and profitable crop, especially in the central portion.

Natural feed is abundant, both on the hillsides and at a higher elevation.

Stock raising is a leading industry, as the reclaimed lowlands for summer grazing and the rolling hills for winter, close together, create conditions whereby a failure is impossible. The stock farms have produced some of the most famous trotting and pacing horses. In addition to the raising of horses, much attention is given to blooded cattle, sheep, and hogs.

Large dairies are conducted, and in the western end the product mostly shipped to the cities is milk, while in the central and eastern parts butter is the main object. Low freight and express rates give unusual advantages.

Contra Costa County is well adapted to poultry raising. Feed can be obtained cheaper than in other sections where the industry is thriving. The central part of the county is only a few hours' drive from Oakland and suburbs. The demand for eggs is always greater than the supply.

The only important mining industry is the coal mines of Mount Diablo, although some little mining for precious metals has been done.

The terminus of the Santa Fe Railroad is located at Point Richmond, and many substantial improvements in the way of wharves, etc., on a very extensive plan, have been constructed.

Post Costa, the shipping point for the bulk of the grain raised in California, has extensive warehouses.

At Pinole are located large stockyards; near Vallejo Junction is the largest smelting works in the State; at Vallona are extensive lumber yards, where ships from Oregon and Puget Sound discharge. At Crockett are flouring mills; also agricultural works.

STATISTICS OF CONTRA COSTA COUNTY, 1909-10.

General Statistics.

Area 877 square miles, or 561,267 acres.	
Value of country real estate...	$13,417,780
Of improvements thereon	$4,837,145
Of city and town lots	$3,821,760
Of improvements thereon	$2,495,805
Of personal property	$7,421,725
Total value of all property.....	$35,399,378
Expended on roads, last fiscal year	$84,903
Road levy per $100, 1910.....	40c
Value of county buildings.....	$415,000
Railroads, steam—miles, 163.54; assessed value	$3,405,163
Electric power lines—miles, 198; assessed value	$175,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	16,000	560,000	$672,000
Barley	50,000	3,000,000	1,500,000
Oats	15,000	900,000	405,000
Corn	1,000	40,000	30,000
Total cereals.	90,000	.....	$2,607,000

	Acres.	Tons.	Value.
Alfalfa hay	2,500	15,000	$120,000
Grain hay	90,000	200,000	2,400,000
Grass hay	10,000	25,000	200,000
Total hay 102,500		240,000	$2,720,000

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	23,000	3,000	26,000
Apricot	44,000	4,000	48,000
Cherry	25,000	6,000	31,000
Fig	4,000	600	4,600
Lemon	1,000	300	1,300
Nectarine	1,000	300	1,300
Olive	15,000	4,000	19,000
Orange	3,400	600	4,000
Peach	65,000	4,000	69,000
Pear	120,000	5,000	125,000
Plum	21,000	1,000	22,000
Prune	80,000	12,000	92,000
Quince	3,000	250	3,250
Total fruit..	405,400	41,050	446,450
Almond	280,000	10,000	290,000
Chestnut	500	.....	500
Pecan	500	.....	500
Walnut	30,000	20,000	50,000
Total nut ...	311,000	30,000	341,000
Grapevines ...3,450,500		340,400	3,790,900
Berries, acres	500	.....	500

Forest Products.

	Amount.	Value.
Redwood (acres)	1,200	.....
Fuel, wood (cords)....	16,000	$96,000
Total value		$96,000

STATISTICS OF CONTRA COSTA COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	150,000	$4,500
Apricots	840,000	.....
Beets	2,000,000	5,000
Celery	1,000,000	100,000
Corn	200,000	30,000
Cherries	2,000,000	80,000
Figs	12,000	600
Gooseberries	2,000	.....
Grapes, table	24,000,000	60,000
Lemons (boxes)	1,000	1,600
Loganberries	12,000	500
Onions	1,000,000	20,000
Oranges (boxes)	1,200	1,700
Olives	500,000	10,000
Pears	1,500,000	30,000
Peaches	1,900,000	47,500
Plums	20,000	3,000
Irish potatoes	102,000,000	18,000
Prunes	1,300,000	26,000
Quinces	22,000	440
Raspberries	4,000	360
Strawberries	12,000	600
Tomatoes	800,000	8,000
Totals	117,676,300	$1,311,960

Dried—	Pounds.	Value.
Almonds	1,800,000	$216,000
Apricots	2,200,000	15,400
Beans	1,500,000	90,000
Pears	250,000	15,000
Peaches	120,000	8,400
Prunes	1,200,000	48,000
Walnuts	160,000	19,200
Totals	7,230,000	$412,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	25,000	$120,000
Ducks	900	5,400
Geese	1,100	16,000
Turkeys	600	12,000
Eggs	875,000	262,500
Total value		$390,700

Miscellaneous Products.

Bees (hives)—Number, 500.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	6,000,000	$960,000
Beer (barrels)	12,000	84,000
Cider	52,000	5,800
Vinegar	25,000	5,000

Number of wineries, 65; number of distilleries, 6; number of breweries, 3.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	8,000	$200,000
Stock	9,250	165,000
Dairy Cows—Graded..	10,000	300,000
Calves	8,000	.....
Swine	10,000	.....
Horses—Thoroughbred	75	15,000
Standard-bred	175	24,000
Common	6,400	320,000
Colts	2,000	40,000
Jacks and jennies	20	3,000
Mules	2,000	110,000
Sheep	20,000	50,000
Lambs	7,000	10,500
Angora goats	200	400

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	1	300	$800,000
Brick	7	450	2,400,000
Cement	1	200	1,500,000
Cigars	5	25	20,000
Confectionery	3	10	10,000
Flouring mills	2	20	200,000
Foundries and iron works	1	26	.....
Furniture	2	50	.....
Lime	3	500	1,000,000
Matches	1	60	50,000
Paper	1	125	500,000
Planing mills	2	500	.....
Artificial stone	1	.....	.....
Oil refineries	3	3,200	.....
Sugar refinery	1	.....	.....
Syrups and extracts. ..		400	.....
Smelter and acid works	..	1,000	.....
Powder works	..	750	3,080,000

DEL NORTE COUNTY.

Del Norte is the extreme northwestern county of California and has a coast line of about 35 miles. Crescent City, the county seat and principal harbor, is 280 miles from San Francisco.

Smith and Klamath are the principal streams, the former in the northern and the latter in the southern part of the county. Both are navigable near their mouths to small ocean-going steamers. Dairying and lumbering are the principal industries. The mountains of the county prospect well in copper and gold-bearing formations.

Crescent City is the chief shipping point. Products usually are sent to the San Francisco market. The county is rich in undeveloped mineral resources. Indications are that a railroad will be built up and down the coast to the county and from the interior. Fruit raising is beginning to engage the attention of the residents. With transportation facilities, Del Norte is destined to become one of the apple-producing regions of California.

STATISTICS OF DEL NORTE COUNTY, 1909-10.

General Statistics.

Area 1,546 square miles, or 989,000 acres.	
Number of farms	152
Number of acres assessed	214,279
Value of country real estate	$3,741,197
Of improvements thereon	$89,404
Of city and town lots	$86,975
Of improvements thereon	$136,880
Of personal property	$308,150
Total value of all property	$4,363,606
Expended on roads, last fiscal year	$13,000
Expended for bridges, last fiscal year	$3,000
Number of miles of public roads	135
Road levy per $100, 1910	40c
Value of county buildings	$22,009
Railroads, steam—miles, 20; assessed value	$35,000
Electric power plants—1; assessed value	$3,500

Cereal Products and Hay.

Wheat, 200 acres—average 25 bu. to acre.
Barley, 300 acres—average 30 bu. to acre.
Oats, 1,500 acres—average 35 bu. to acre.
Grain sells on average of $30 per ton.
Grain hay, 2,000 tons—average 2 tons per acre.
Grass hay, 3,000 tons—average 1½ tons per acre.
Hay ranges from $10 to $18 per ton, fed mostly on place of production.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	4,500	1,000	5,500
Cherry	250	.....	250
Peach	400	.....	400
Pear	500	200	700
Plum	500	150	650
Prune	250	250	500
Total fruit	6,400	1,600	8,000

Grapevines (all kinds)—10 acres.
Berries (all kinds)—25 acres.
All used for home consumption.

Fruits, Vegetables, Etc.

Apples, 65 tons.
Irish potatoes, 300 tons—average price 1½ cents per pound.
Strawberries—enough for home consumption.
Tomatoes—enough for home consumption.

Fish Industry.

	Pounds.	Value.
Salmon (cases)	8,000	$56,000
Other kinds (barrels)	300	3,000
Fresh salmon (shipped to Eureka)	.....	1,500
Total		$60,500

Dairy Industry.

	Production.	Value.
Butter (pounds) about	1,000,000	$250,000

Number of creameries, 9; skimming stations, 1.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,000	$20,000
Stock, calves, etc.	1,500	25,000
Dairy Cows—Graded	4,000	75,000
Swine	2,000	17,000
Horses—Thoroughbred	5	2,500
Standard-bred	10	3,500
Common	450	22,500
Colts	100	2,500
Mules	10	1,200
Sheep	1,200	4,800
Lambs	500	1,200
Angora goats	200	1,000
Common goats	150	300
Wool (pounds)	25,000	

Poultry and Eggs.

	Dozen.	Value.
Chickens	450	$1,800
Ducks	4	24
Turkeys	24	600
Eggs	.....	1,200
Total value		$3,624

Forest Products.

Area of timber lands (acres), 146,000.
Redwood (acres), 100,000.
Timber values range from $15 to $250 per acre.
Sawmills, 2, valued at about $300,000.
Lumber, about 32,000,000 feet, including short stuff—average value $15 per thousand.
Shingles, 17,000,000.
Power used for mills and manufactories in county—Steam, 2; electrical, 1.

Manufactories.

Meat products—Hides, 30 tons; lard, 7½ tons; meat packed, 130 tons.

EL DORADO COUNTY.

El Dorado County is situated on the western slope of the Sierra Nevada Mountains, in the eastern portion of the State. The county is about 75 miles long and about 30 miles in width. The western portion of the county borders the Sacramento Valley, and is used principally for grazing, stock raising, and wine vineyards. The central portion of the county includes the great mineral belt, known as the Mother Lode, from which millions of dollars have been extracted on and near the surface. This belt affords great opportunities for capital, as deep mining is but in its infancy. In this belt, which is chiefly foothills, can be found some of the best fruit lands in the State, El Dorado County being noted for the size and flavor of its apples, pears, plums, peaches, and other fruits.

The eastern portion, being at an altitude of from 3,000 to 7,000 feet, supplies summer pasturage for a vast number of cattle, sheep, and horses. In this region water is abundant, awaiting capital and labor to harness the everflowing streams. Most of this area is covered by a virgin growth of sugar and white pine, fir, and cedar timber, from which the eastern markets are supplied with a portion of their high-grade lumber.

STATISTICS OF EL DORADO COUNTY, 1909-10.

General Statistics.

Area 1,796 square miles, or 1,049,440 acres.	
Number of farms	2,485
Number of acres assessed	637,968
Value of country real estate	$3,266,515
Of improvements thereon	$671,955
Of city and town lots	$252,485
Of improvements thereon	$502,780
Of personal property	$632,415
Total value of all property	$6,142,658
Expended on roads, last fiscal year	$22,165
Expended for bridges, last fiscal year	$5,000
Number of miles of public roads	760
Road levy per $100, 1910	40c
Value of county buildings	$15,000
Irrigating ditches — miles, 160; cost	$370,000
Railroads, steam — miles, 92; assessed value	$911,243
Electric power plants — 1; assessed value	$91,715
Electric power lines—miles, 36; assessed value	$18,000
Number of acres irrigated—	
By irrigating canals	15,960
By springs and small streams	10,000

Cereal Products and Hay.

	Acres.	Tons. (Tons of 2,000 pounds.)	Value.
Wheat	200	200	$9,000
Barley	100	100	4,800
Oats	100	100	4,500
Total cereals	400	400	$18,300
Grain hay	44,000		$528,000
Grass hay	2,000		15,000
Total hay	46,000		$543,000

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	5,900	2,800	8,700
Apricot	600	350	950
Cherry	2,600	900	3,500
Fig	1,550	.....	1,550
Nectarine	1,700	500	2,200
Olive	3,800	500	4,300
Orange	900	100	1,000
Peach	125,500	14,800	140,300
Pear	12,500	10,000	22,500
Plum	5,800	500	6,300
Prune	18,000	600	18,600
Quince	500	.....	500
Other kinds	15,000	1,000	16,000
Total fruit	194,350	32,050	226,400
Almond	1,000	.....	1,000
Chestnut	500	.....	500
Walnut	750	900	1,650
Other nuts	100	.....	100
Total nut	2,350	900	3,250
Grapevines	332,700	900	333,600
Berries, acres.	60	20	80

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	12,800	$5,000
Sweet wines	8,000	8,000
Beer (barrels)	1,200	12,000
Brandy	7,000	14,000
Cider	600	150
Vinegar	7,000	1,750

Number of wineries, 5; number of distilleries, 4; number of breweries, 1.

Dairy Industry.

	Production.	Value.
Butter (pounds)	220,000	$70,000
Cheese (pounds)	14,000	2,800

STATISTICS OF EL DORADO COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	300,000	$4,500
Cherries	50,000	3,500
Figs	4,000	160
Pears	2,160,000	64,800
Peaches	1,960,000	35,000
Plums	260,000	6,400
Prunes	180,000	5,200
Totals	4,914,000	$119,560
Dried—	**Pounds.**	**Value.**
Grapes	600,000	.....
Peaches	20,000	$1,200
Prunes	40,000	1,500
Totals	660,000	$2,700

Live Stock Industry.

	Number.	Value.
Cattle—Beef	3,500	$100,000
Stock	11,000	160,000
Dairy Cows—Graded	4,500	100,000
Thoroughbred—		
Herefords	100	4,000
Holsteins	150	5,500
Calves	4,000	40,000
Swine	1,200	8,500
Horses—Thoroughbred	100	20,000
Standard-bred	500	70,000
Common	1,500	80,000
Colts	700	9,500
Jacks and jennies	10	1,000
Mules	200	20,000
Sheep	3,000	9,000
Lambs	1,500	3,500
Angora goats	1,600	3,000
Common goats	2,000	2,000
Total stock	35,560	$636,000
Wool (pounds)	7,000	1,600
Mohair (pounds)	2,000	600

Miscellaneous Products.

	Value.
Bees (hives)—number 500	$2,500
Honey	4,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	1,500	$7,000
Ducks	250	1,500
Geese	150	600
Turkeys	300	4,000
Total value		$13,100

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	150,000	$1,500,000
Sawmills (number)	7	90,000
Charcoal (sacks)	1,000	600
Fuel, wood (cords)	9,000	19,000
Lumber (feet)	10,000,000	200,000
Piles	1,500	8,000
Shakes (thousand)	900	6,000
Shingles (thousand)	300	600
Total value		$1,824,200

Power used for mills and manufactories in county—Steam (number), 21; electrical (number), 6; water (number), 28.

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	3	75	$150,000
Carriages and wagons	2	5	12,000
Cigars	4	10	14,500
Foundries and iron works	2	5	15,000
Meat products—			
Hides	..	.....	7,500
Lard	..	.....	5,000
Tallow	..	.....	4,500
Planing mills	2	10	25,000

This county has four granite quarries, four marble quarries, two sandstone quarries, and one big slate quarry.

Manufactured Output.

	Quantity.
Cigars (thousand)	350
Lime (barrels)	500
Hides (pounds)	90,000
Lard (pounds)	5,000
Tallow (barrels)	350

FRESNO COUNTY.

Including vineyards, Fresno is the greatest fruit and wine producer in the State of California. Of the fifty-eight counties in the State, the first twenty-seven were organized on February 18, 1850, and six years later Fresno County was formed on April 19, 1856. It is situated in the exact center of the State, and in the middle of the fertile San Joaquin Valley. There are only four counties which exceed Fresno in size—San Bernardino, Inyo, Kern, and Riverside, in the order named. When Fresno was first formed it was considerably larger, but on the 11th day of March, 1893, a large slice, consisting of 2,140 square miles was carved out of the northern part of the county, and formed into Madera County; and still more recently, Fresno County was again mutilated by a little over 117 square miles of the southeast portion being transferred to Kings County by an act of the Legislature approved April 12, 1909.

Before being partitioned, Fresno County comprised 7,746 square miles, but the land area now amounts to 6,035 square miles, or 3,862,400 acres, and, therefore, still remains the fifth largest county of the fifty-eight in the State, and one of the most productive. It is also the fifth largest in population.

Among the other towns in the county are Coalinga, one of the largest oil-producing districts in the world; Selma, Kingsburg; also, Sanger and Clovis, both having large sawmills and lumber depots; Reedley, on the Kings River, near the foothills; Laton, in the center of a large agricultural and dairying district, and Kerman, the latest town in the county.

The word "Fresno," in Spanish, signifies ash tree, and it was because of the abundance of mountain ash in the mountains of this county that it received its name.

TOPOGRAPHY AND SOIL.

Fresno County is naturally subdivided into two portions—plains and mountains. The plains are the bottom of the San Joaquin Valley, extending from the foot of the Coast Range on the west, to the foothills of the Sierra Nevadas on the east. The trough of the valley south of Fresno has an elevation of 180 feet. Fresno City has an elevation of 290 feet, and the valley, at the edge of the foothills, has an elevation of about 500 feet. From the first foothills the rise is rapid, the mountains culminating in peaks rising 10,000 to 12,000 feet high. The country about Fresno is a vast plain intersected by the San Joaquin and Kings rivers and their tributaries. Four natural soil divisions have been recognized—the foothill region, where agriculture was formerly confined to grazing; the plains of the valley, with red soils lying near the hills; the "white ash" soil found further out in the plain, and the bottoms, or alluvial lands, along the Kings River.

CLIMATE AND RAINFALL.

There is a dry and a wet season; the former from about May to September; and the latter from the middle of October or early part of November. The average rainfall at Fresno is about 10.12 inches annually. The rains, which are at irregular intervals during the winter, seldom last more than two or three days at a time. There are about 275 days of sunshine in the year. The atmosphere during the summer months is dry, and the heat not nearly so oppressive as in the East, and other places where the humidity is great. Sunstroke is unknown.

POPULATION.

Considering that California was only admitted as a State on September 9, 1850, and that Fresno was only organized as a county in 1856, its steady increase in population and prosperity has been wonderful. When we come to consider the results which have been obtained within less than a span of an ordinary lifetime by a mere handful of people, it is simply marvelous. In 1880 the population was 4,605; 1870, 6,336; 1880, 32,026; 1900, 37,862, and, according to the last census, just completed, 75,657.

FARMS AND FARMING.

The county has passed through four stages of development. First came mining in the early days before it was organized as a county, and this period extended to about 1860-64. Secondly, came the stock raising period, which arose upon the gradual disappearance of placer mining, and lasted until 1874, although sheep raising still continued on a large scale; thirdly, about 1868, the farming interest sprang up, although prior to the advent of the railroad in 1870, agriculture amounted to very little. The fourth and most important may be called the viticultural and fruit era, which began to come into prominence early in the eighties, and has now become the leading feature of the county. There is a mistaken impression among many homeseekers that farms and vineyards are all on a large scale, but the days of enormous land grants and ranches are over, and the land is now being rapidly subdivided and settled.

IRRIGATION.

As California holds the first place among all the states in the Union in irrigation, so Fresno is the leading county in the State, both in number and extent of its canals and ditches, having more than double the acreage under irrigation than any other county. In 1880 there were only about 65 miles of main canals in the county, whereas now there are over 450 miles of main canals and thousands of distributing ditches, irrigating some 400,000 acres. Most of the canals are owned by corporations, whose interests are entirely separate and distinct from the ownership of the land irrigated. The remainder are owned by companies, the stock of which is, for the most part, in the hands of the landowners. The capacity of these canals is 500 cubic feet per second. All draw their water from the Kings River. The combined capacity of these canals is 3,500 cubic feet per second. The water is much cheaper than in many other parts of the State, being only 62½ cents per acre per annum under the Fresno and Laguna canals, and 75 cents per acre under the Consolidated Canal.

FARM AND FARM PRODUCE—CEREALS.

In the cultivation of cereals, the county has fallen off greatly during the last nine years, especially in wheat and barley. The acreage is reported as follows, but is really much larger (from the assessor's books):

Wheat	8,400 acres.
Barley	7,500 acres.
Alfalfa hay	57,800 acres.
Oats	1,800 acres.
Hay	6,700 acres.

DAIRY PRODUCTS.

During the last ten years the dairy industry has made great progress, except in the manufacture of cheese, which, however, was never produced on a very large scale. In 1898 only 291,754 pounds of butter were produced and 604,861 in 1900, and 4,940,000 in 1910.

VINEYARD AND ORCHARD FRUITS.

Including grapes, Fresno produces more fruit than any other county in the State, and California produces twenty-five per cent of the total value of fruit raised in the United States.

Fresno County holds the first place in the production of grapes, raisins, figs, sweet wines, and brandy, and is one of the leading counties of the State in the production of peaches, apricots, and olives, and the acreage in citrus fruits is spreading. Fresno's output of raisins for 1910 was 33,079 tons.

CITRUS FRUITS.

The shipments of oranges raised in Fresno County during the last four seasons have been, in round numbers, as follows:

Season.	Oranges, cars.	Lemons, cars.
1905–6	150	15
1906–7	200	15
1907–8	210	20
1908–9	220	12
1909–10 (to December 31st)	175	15

A car load consists of 362 boxes of oranges, and 312 of lemons.

OLIVES AND OLIVE OIL.

Fewer records appear to have been kept regarding this industry than most others. There are, according to the best authorities, about 12,000 to 14,000 acres of olive trees planted in the State, of which almost half are in bearing. Last year about 350,000 gallons of olive oil and 450,000 gallons of pickled, ripe and green, olives were produced in the State. Fresno has a larger acreage in olives than any other county in the San Joaquin Valley. Fresno County produced the following quantities:

Year.	Pickled olives, gallons.	Olive oil, gallons.
1905	10,000	2,500
1906	5,000	5,000
1907	40,000	14,000
1908	45,000	16,000
1909	38,000	12,000
1910	43,000	10,000

WINE AND BRANDY.

The production of sweet wine and brandy during the last few years has been as follows (gallons):

Year.	California. Sweet wine.	California. Com. brandy.	Fresno County. Wine.	Fresno County. Brandy.
1905	11,502,000	1,200,000	———	———
1906	15,992,000	1,345,000	———	———
1907	16,304,000	1,450,000	6,000,000	1,250,000
1908	14,500,000	1,500,000	6,800,000	1,000,000
1909	16,000,000	1,800,000	7,500,000	1,200,000
1910 (est.)	14,000,000	1,300,000	5,950,000	750,000

Fresno County also produced about 150,000 gallons of dry wine in 1909, and the same in 1910, and about 40,000 gallons of grape juice.

There are twenty-six wineries in Fresno County, including one Japanese winery at Fowler, and twenty-nine distilleries. The proportions of the various kinds of sweet wines produced in Fresno County are approximately as follows:

Port	3,300,000
Sherry	1,950,000
Angelica	320,000
Muscat	200,000
Tokay	95,000
Malaga	85,000
Total	5,950,000

DRIED AND CANNED FRUITS.

(Approximate quantities and average prices.)

DRIED FRUITS.

Fruit.	1909. Quantity, tons.	1909. Per pound, cents.	1910. Quantity, tons.	Price. Lowest. Cents, per pound.	Price. Highest. Cents, per pound.
Apricots	750	7 to 8½	1,000	7	10
Figs	2,100	2 to 2¾	3,000	2½	4½
Nectarines	450	3½ to 5	500	4	6
Peaches	8,500	3¾ to 5	7,500	4	5½
Pears	100	5 to 7	100	6	8
Plums	50	4 to 6	30	5	7
Prunes	750	1¾ to 2½	200	2½	4½

GREEN FRUIT—CANNED AND SHIPPED.

Fruit.	Tons.	Lowest and highest price, 1910, per ton.	
Apricots	400	$20 00	$30 00
Peaches—			
Tuscan Clings	1,500	22 50	———
Orange Cling	2,700	12 00	20 00
Phillips Cling	3,000	15 00	25 00
Early Crawford	———	———	———
Early Foster	800	15 00	20 00
Muirs, Freestone	900	15 00	20 00
Lovells	1,600	15 00	20 00
Elbertas	1,000	15 00	20 00
Plums	400	20 00	30 00

FIGS.

The quantity of figs in Fresno takes the lead, has much improved of late years, and the fruit appears to be growing in favor.

The quantity packed in Fresno in the last six years has been:

Year.	Tons.
1905	2,500
1906	2,700
1907	3,300
1908	3,800
1909	2,100
1910	3,000

BEES AND HONEY.

In 1899, Fresno produced 567,800 pounds of honey; in 1908, 777,050 pounds; the estimated crop for this season being considerably less.

FISH AND GAME.

The varieties of fish include salmon, black bass, trout, and catfish, all of which are plentiful.

There is an abundance of game, including quail, doves, a large variety of ducks and wild geese, but there is no means at present of ascertaining either the quantity or money value of either fish or game. The sums received for hunting licenses, however, are considerable, in 1908-9 being $3,657, and in 1909-10, $4,194.

THE LUMBER INDUSTRY.

The value of this industry to the county is very considerable, varying from sixty to seventy-five million feet, board measure, with an average value of some two million dollars a year. The different varieties are approximately as follows:

Year.	Sugar pine.	White pine.	Fir.	Sequoia.	Total.
1905	9,000,000	6,000,000	30,000,000	15,000,000	60,000,000
1906	9,000,000	6,000,000	30,000,000	15,000,000	60,000,000
1907	10,000,000	5,000,000	35,000,000	20,000,000	70,000,000
1908	9,000,000	4,000,000	35,000,000	10,000,000	58,000,000
1909	11,000,000	6,000,000	30,000,000	----------	47,000,000

NOTE—Feet, board measure.

The price of lumber was about 10 per cent higher in 1909 than in the previous year.

For the year 1910, the exact figures can not yet be given, but the total lumber cut amounts to between 65,000,000 and 70,000,000 feet, and taking into account the shakes, shingles and trays made at different mills, would bring the total to 75,000,000 feet, which, at a conservative estimate, would be worth about $1,500,000.

MANUFACTURES OF FRESNO.

The great increase in the manufactures of Frenso is due chiefly to the increase in the canning and preserving of fruits and vegetables, the value of products for which amounted to $6,942,440, and formed 70.5 per cent of the total value of all the manufacturing industries of the city. Most of the fruit preserving of Fresno is by the drying or evaporating process, and the greatest part is in raisins, in which Fresno leads the world.

NUMBER OF ESTABLISHMENTS.

1905	84
1900	62
Per cent of increase	35.5
Capital:	
1905	$3,501,808
1900	1,435,263
Per cent of increase	144.0
Wage-earners:	
1905 average number, 1951; wages	$1,085,926
1900 average number, 819; wages	395,586
Per cent of increase, 138.2; per cent of increase	174.5
Value of products:	
1905	$9,849,001
1900	2,752,201
Per cent of increase	257.9

There are several foundries, agricultural and implement works, iron works, macaroni and soap factories, and many others, which have come into existence or been greatly extended during the last two years.

MINERALS.

Fresno county is rich in minerals, but as yet, little has been done to develop what some day will be a great and prosperous industry. Gold, silver, copper, antimony, iron, bismuth, chrome, magnesite, building stone, and mineral waters are among the minerals awaiting utilization. The copper deposits that have so far been in any way worked are all near the northern side of the county.

VALUE OF MINERAL PRODUCTS IN THE LAST FIVE YEARS.

Substance.	1905.	1906.	1907.	1908.	1909.
Asphalt	----------	----------	----------	$5,000	$4,400
Brick	$60,000	$64,000	$57,320	106,960	49,375
Copper	224,640	88,000	50,000	----------	111,341
Gold	40,037	8,943	2,401	1,054	----------
Granite	----------	----------	10,500	16,900	14,400
Granite	----------	----------	10,500	16,900	14,400
Magnesite	----------	----------	----------	----------	8,500
Silver	9,187	83	26	11	----------
Petroleum	2,400,000	1,974,470	3,620,120	5,898,964	9,243,971
Potter's clay	----------	----------	----------	26,000	----------
Macadam, tons	----------	----------	----------	----------	45,375
Totals	$2,734,164	$2,135,046	$3,740,397	$6,055,389	$9,445,978

Substance	Quantity. 1907.	1908.	1909.
Asphaltum (tons)	----------	500	400
Brick (millions)	9,230	13,220	7,950
Clay (tons)	----------	9,000	----------
Copper (pounds)	250,000	----------	876,837
Gold (value)	$2,041	$1,054	----------
Magnesite (tons)	----------	----------	850
Petroleum (barrels)	9,050,300	10,725,389	15,406,619
Silver (value)	$26	$11	----------
Granite, (cubic feet)	9,200	16,900	18,000
Macadam (value)	----------	----------	$14,000

The figures for 1910 are not yet complete.

COALINGA OILFIELDS.

In the last ten years the production of petroleum in Fresno County has developed from a small beginning into one of its most important industries.

In 1907 only 70,140 barrels were produced. The production now is 15,406,619 barrels.

STATISTICS OF FRESNO COUNTY, 1909-10.

General Statistics.	
Area 6,035 square miles, or 3,862,400 acres.	
Number of farms in 1900	3,290
Number of acres assessed	2,684,926
Value of country real estate	$28,860,648
Of improvements thereon	$6,601,633
Of city and town lots	$7,919,333
Of improvements thereon	$6,372,437
Of personal property	$8,781,040
Total value of all property	$65,263,510
Expended on roads, last fiscal year	$245,341
Expended for bridges, last fiscal year	$9,171

General Statistics—Continued.	
Number of miles of public roads	2,400
Road levy per $100, 1910	38c
Value of county buildings	$1,260,000
Irrigating ditches—miles	450
Railroads, steam — miles, 269; assessed value	$6,305,702
Railroads, electric — assessed value	$137,375
Electric power plants — 1; assessed value	$146,795
Electric power lines — miles, 140; assessed value	$60,271
Number of acres irrigated—upwards of	400,000

STATISTICS OF FRESNO COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres.
Wheat	8,400
Barley	7,500
Oats	1,800
Total cereals	17,700
Alfalfa hay	57,800
Grain and grass hay	6,700
Total hay	64,500

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	20,000	4,800	24,800
Apricot	145,600	11,300	656,900
Fig	126,000	23,000	149,000
Lemon	21,500	9,000	30,500
Nectarine	30,000	660	30,660
Olive	42,500	5,300	47,800
Orange	89,400	10,300	99,700
Peach	3,270,000	760,000	4,030,000
Plum	10,600	2,360	12,960
Prune	83,000	5,600	88,600
Total fruit	3,838,600	832,320	4,671,920
Almond	9,000	2,300	11,300
Grapevines	88,400	15,075	103,475

Wines, Brandies, Etc.

	Gallons.
Dry wines	150,000
Sweet wines	5,950,000
Brandy	750,000
Grape juice	40,000

Number of wineries, including one Japanese at Fowler, 26; number of distilleries, 29; number of breweries, 1.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	2,370	$71,100
Stock	22,600	271,200
Dairy cows	32,860	657,200
Thoroughbred—Angus	218	10,900
Calves	9,210	46,050
Swine	7,482	29,930
Horses—Thoroughbred	127	38,400
Common	14,976	599,040
Colts	1,830	36,600
Jacks and jennies	60	1,200
Mules	3,246	256,950
Sheep	54,130	109,310
Lambs	26,730	26,730

GLENN COUNTY.

Glenn County, originally a part of Colusa County, was incorporated May 11, 1891. It lies near the center of the Sacramento Valley, extending from the summit of the Coast Range across the Sacramento eastward, containing 1,550 square miles, one third being mountainous, but affording good summer pasturage for stock. About the same area is in the foothills with many fertile ranches and the remaining third practically a level valley floor of wonderfully fertile soil which has for the past forty years been continuously cropped to grain and still continues to produce good crops.

The average temperature for the year is 64° Fahrenheit. The coldest is 25° above zero, and the highest 115°. The maximum temperatures are reached in July and August and are of short duration, generally lasting from one to three days, the usual maximum being not greater than 110°. The relative humidity, however, is low, greatly reducing the sensible temperature. The nights are always cool, there being a daily range of temperature during the hot months of from 25° to 30°. The rainfall averages about 17 inches annually, and comes between the months of October and April. The climate is particularly suited to the growth of fruits of all kinds, and with the abundant rich feed makes possible an even unchecked growth of live stock.

The United States Reclamation Service has installed a system to irrigate 14,000 acres of the fertile lands about the town of Orland. This project is designed as a model irrigation system, and was undertaken by the reclamation service to demonstrate the benefits of irrigation under perfect conditions of soil and climate. The works consist of an impounding dam, situated at East Park in Colusa County, a diversion dam at the Buttes in Tehama County, and 99 miles of canals and main laterals, about 100 miles of small field ditches, all constructed by the United States under the supervision of its own engineers; the cost of the works is charged against the land, to be repaid in ten annual installments without interest. The impounding dam is now completed and awaits the winter flood water to fill the reservoir, which has a capacity of 45,000-acre feet of water, which will be released during the dry months to supplement the natural stream flow of Stony Creek. This water is carried 40 miles to the diversion dam at a point where the creek debouches upon the plains. Here the water is turned through the headgates into main canals. The diversion dam is fifty per cent complete, the ditches and canals eighty per cent complete, and work is being pushed so as to furnish water for the season of 1911. By the terms of the contracts the Government required of the owners before undertaking the project that this land must be sold in tracts of 40 acres or less. The approximate cost of $650.000 will be distributed over ten years and charged to at least 14,000 acres; the annual charge for construction will be less than $5.00 per acre. The dam and system are now so nearly complete that many acres will be added to the already profitable groves of oranges and lemons, and fields of alfalfa.

The United States Soil Survey describes the soil as "deep, friable and

productive and adapted to a wide range of fruit and field products and especially those produced under irrigation and intensive farming." With a normal rainfall one crop of grain or three crops of alfalfa are produced—with irrigation alfalfa is harvested from four to six times, yielding from six to ten tons to the acre. The yield of the crops is also correspondingly increased. Owing to the extensive system of grain farming, and the very limited number of small irrigated farms, the average farm in Glenn County up to the past year was over 1,000 acres, necessitating a rather sparse population. The population in 1900 was but 5,150, and while the yearly increase has been good, only during the past year has the real awakening begun.

The great irrigation project of the Sacramento Valley Irrigation Company, with headquarters at Willows, together with that of the United States Government at Orland, has revolutionized things. Their lands are now being sold in 20, 40, and 80 acre lots, and a vast number of settlers are coming in daily.

Willows, the county seat, is 150 miles north of San Francisco on the main line of the Southern Pacific and 80 miles from Sacramento, the State capital. The population of Willows is over 3,400, the increase in the past year being almost 100 per cent. Always an important commercial point for what has in the past been one of the great grain producing sections of the State, not until the Sacramento Valley Irrigation Company established here their headquarters were the great possibilities really fully appreciated. There is great activity in building both residences and business houses, and the opportunity for profitable investment is magnificent. Six religious denominations are represented in Willows, the Baptist, Episcopal, Methodist, Catholic, Christian, and Presbyterian. Educational facilities are the best there are, being a grammar school and a high school. Present conditions, however, point to additional schools in another year.

Orland is 15 miles north of Willows on the main line of the Southern Pacific. It is a thrifty, prosperous town of about 1,200 inhabitants. The United States Government is developing an irrigation project here of about 14,000 acres. Here is also located an experimental station, consisting of about 10 acres. Considerable activity exists in the sale of farm lands and the town is growing fast. Orland has three churches, the Methodist, Baptist, and Catholic, a high school and grammar school, and all other conveniences for an up-to-date growing community.

Hamilton City came into existence in 1905 with the building a $1,000,000 sugar beet factory. It is located on a branch line of the Southern Pacific and Northern Electric railroads. It is quite a flourishing and progressive town of about 800 inhabitants, having churches, school, electric lights and telephone, etc. The sugar beet factory has a capacity of 700 tons per day, working 400 men. The other railroad towns are Germantown and Fruto.

Realizing it is equally as important to take care of the waste water as is the supplying of it, the irrigation company as they construct their canals and laterals are building a great drainage system. All checks and gates in the canals and laterals are of concrete construction, water being delivered to the highest boundary of each 40-acre tract. With roadways, too, around each 160 acres. There is now ready for water over 1,500 acres and it is their intention to have fully 20,000 additional ready by May, 1911.

The Orland project, while the smallest yet undertaken by the United States Reclamation Service, is complete in itself and will irrigate about 15,000 acres. It is regarded now as one of the units in a general system, and will likely be materially enlarged at no distant day.

The county roads are excellent. They are graded, graveled, and kept in splendid condition; the gravel in all parts of the county being particularly adapted to road making.

Great impetus has been given the dairy industry, and with the alfalfa now being planted and the number of pure bred stock being bought, together with the many natural advantages, Glenn County will soon take her place as one of the great dairy centers of the State. It also means further interest in the way of hogs and chickens. The latter, however, is now receiving considerable individual attention in the way of the establishment of several large poultry farms. With the planting, too, of large acreages to alfalfa the bee industry is also beginning to attract considerable attention.

Professor Elwood Mead of the United States Experiment Station at one time and in charge of irrigation investigations, now the head of the department of irrigation of Australia, said: "Within a radius of five miles in the Sacramento Valley I saw every product of the temperate and semitropical zones which I could call to mind. Apples and oranges grew side by side, as did oak and almond and walnut trees. There were olives from the south and cherries from the north. A date palm seemed equally at home with an alfalfa meadow, figs and Tokay grapes were apparently as much in their element as the fields of wheat and barley or the rows of Indian corn, some of the stock of which measured 15 feet in height. All of these things could have been grown on a single acre and doubtless have been."

Every yard has its orange and lemon trees, some being cared for and irrigated, the most of them, though, not; still all do well and produce delicious fruit. At Orland there are several orange groves from six to ten years old, and all doing exceedingly well. Peaches, apricots, cherries, pears, prunes, olives, figs, grape, and nuts of all kinds yield in the greatest abundance, whereas in the foothills can be found some of the best apples that can be grown anywhere. Now that irrigation is at hand, large acreages will also be planted to orchard.

Soil and climatic conditions in Glenn County are particularly well adapted to the culture of grapes, and the United States Department of Agriculture has recently arranged to establish an experimental station near Willows where extensive experimental work in grape culture will be carried on.

This is one of the most promising industries of the county. The presence of a great sugar factory, a sure crop, a live market, and a cash return make it truly an attractive proposition. The beet reaches its highest perfection here and as prices are highest when the sugar content is greatest, the industry here nets splendid returns per acre. The yield is from 10 to 25 tons per acre with the sugar content as high as 27 per cent.

A Nevada corporation purchased several sections between Willows and Germantown in the spring of 1908 and planted 60,000 eucalyptus trees, which are now from six to fifteen feet high. Notwithstanding the lack of irrigation and the small amount of rainfall the past two seasons,

the loss has only been two per cent. They are growing vigorously and show great possibilities.

The Sacramento Valley Irrigation Company, coöperating with the United States Government, planted a three-acre patch to forty different varieties of rice about one mile south of Willows the past spring. The greater portion has already been harvested and is of exceptional quality, all, too, yielding abundantly. The government experts pronounce it equal to any that is grown in the great rice states. The Sacramento Valley Irrigation Company will continue the experiment on a larger scale the coming year. Mr. Z. S. Spaulding, too, a large land owner is arranging to seed an acreage of about 150 acres and to irrigate with pumps. Every indication points to a great future for this industry.

Experiments have also been made with flax, sufficient to demonstrate the fact that it can be made a profitable crop. Cotton, too, shows it can be grown to advantage. In fact, there are few of the necessities or luxuries that grow out of the ground that can not be successfully produced in Glenn County.

Sandstone, cement, manganese, and copper possibilities still lie unworked only waiting capital and intelligent effort to make them exceedingly profitable.

Glenn County is the hunter's paradise. Black bass, striped bass, salmon, perch, catfish, trout, and many other varieties abound in the Sacramento River, and the mountain streams are full of speckled trout, while the heavy growth of brush along the river banks and in the foothills is full of quail, deer, squirrels, and other game, whereas from the middle of November to the first of March, when the wild geese and ducks come into winter quarters, good sport is enjoyed, the hunters killing them by the hundreds.

Glenn County is indeed forging ahead and offers wonderful possibilities in every line for the homeseeker or investor.

STATISTICS OF GLENN COUNTY, 1909-10.

General Statistics.

Area 1,545.09 square miles, or 989,344 acres.	
Number of farms	1,223
Number of acres assessed	687,808
Value of country real estate	$9,457,409
Of improvements thereon	$570,810
Of city and town lots	$548,791
Of improvements thereon	$333,360
Of personal property	$1,755,947
Total value of all property	$14,068,293
Expended on roads, last fiscal year	$70,707
Expended for bridges, last fiscal year	$92,838
Number of miles of public roads	511
Value of county buildings	$140,000
Irrigating ditches — miles, 182; cost	$750,000
Drainage ditches—miles, nearly	136
Railroads, steam—miles, 55.78; assessed value	$1,378,665
Railroads, electric — miles, 4.9; assessed value	$23,211
Electric power lines—miles 63; assessed value	$52,940
Number of acres irrigated	6,580

Dairy Industry.

	No.	Production.	Value.
Creameries	2	182,333	$85,629

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	3,350	755	4,105
Apricot	4,475	310	4,785
Cherry	385	70	455
Fig	2,780	1,140	4,920
Lemon	4,025	480	4,505
Nectarine	48	40	88
Olive	1,715	410	2,125
Orange	6,890	1,975	8,865
Peach	5,880	910	6,790
Pear	2,815	825	3,640
Plum	865	545	1,410
Prune	6,985	411	7,396
Quince	68	.....	68
Total fruit..	40,281	7,871	49,152
Almond	7,370	650	8,020
Chestnut	10	.....	10
Pecan	34	10	44
Walnut	3,135	710	3,845
Total nut ...	10,549	1,370	11,919
Grapevines ...	35,350	2,700	38,050
Berries, acres.	42	15	15

STATISTICS OF GLENN COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

	Total Production. Pounds.	Value.
Green—		
Apples	160,300	$3,200
Apricots	78,700	1,574
Blackberries	17,500	875
Beans	36,900	1,476
Beets	2,150	65
Cabbage	8,500	170
Cauliflower	5,850	451
Corn	148,250	1,482
Cherries	2,750	275
Figs	56,100	1,683
Grapes	561,600	.....
Lemons (boxes)	640	1,920
Loganberries	48,200	1,446
Onions	147,150	1,471
Oranges (boxes)	3,620	9,050
Olives	16,400	346
Pears	107,100	2,142
Peaches	112,300	2,246
Peas	5,200	248
Persimmons	2,840	286
Plums	8,550	214
Irish potatoes	485,950	4,860
Sweet potatoes	52,200	1,044
Prunes	10,400	156
Raspberries	6,550	390
Strawberries	16,100	810
Tomatoes	508,700	5,087
Totals	2,570,500	$49,943
Dried—	Pounds.	Value.
Almonds	80,310	$9,637
Figs	1,250	62
Prunes	76,400	1,528
Totals	157,960	$11,227

Fish Industry.

	Pounds.	Value.
Salmon	48,150	$3,852
Other kinds	11,200	896
Totals	59,350	$4,748

Cereal Products and Hay.

	Tons of 2,000 pounds. Acres.	Bushels.	Value.
Wheat	17,695	317,510	$266,708
Barley	55,680	1,169,280	549,551
Oats	755	18,875	12,202
Rye	40	760	456
Corn	560	21,280	13,300
Total cereals..	74,730	1,602,435	$842,217
	Acres.	Tons.	Value.
Alfalfa hay	4,535	13,405	$81,630
Grain hay	12,850	17,850	122,950
Total hay	17,385	31,255	$204,586

Live Stock Industry.

	Number.	Value.
Cattle—Stock	10,654	$159,810
Dairy Cows—Graded..	1,642	41,050
Thoroughbred—		
Herefords	5	1,000
Holsteins	12	1,800
Jersey	44	4,400
Calves	2,471	24,710
Swine	9,081	49,405
Horses—Thoroughbred	3	3,000
Common	2,485	124,250
Colts	1,011	30,330
Jacks and jennies	4	1,200
Mules	2,487	248,700
Sheep	91,380	274,140
Angora goats	4,855	9,710
Total stock	126,134	$973,505
Wool (pounds)	448,300	67,245
Mohair (pounds)	24,275	6,075

Poultry and Eggs.

	Dozen.	Value.
Chickens	5,164	$20,656
Ducks	209	1,254
Geese	18	216
Turkeys	638	12,072
Eggs	112,300	2,246
Total value		$36,444

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	100,390	$501,950
Sawmills (number)	1	4,000
Fuel, wood (cords)	2,790	16,740
Lumber (feet)	840,000	16,800
Total value		$539,490

Miscellaneous Products.

	Pounds.	Value.
Bees (hives)—No. 482.	.....	$1,446
Broomcorn	208,800	10,400
Honey	3,200	320
Sugar beets (tons)	20,005	100,025

Manufactories.

In Glenn County there are one steam-power plant and four electrical-power plants. It has one brickyard, one cement product factory, two cigar factories, one sewer pipe factory, two planing mills, and one beet sugar factory. It turns out 119,000 pounds of crackers, and 85,000 pounds of lard.

HUMBOLDT COUNTY.

Humboldt County, a veritable empire in itself, has long laid virtually undisturbed, in the northwestern part of California. There is no section in the Golden State to-day where natural resources give so great an opportunity for development. But having no rail connection with the outside world, the stream of homeseekers pouring into the west has never been directed toward this region, though it presents as great attractions as many other parts of the Pacific coast. This, though, will soon be a thing of the past—the Northwestern Pacific Railroad Company is rapidly laying the rails that will connect this county with the rest of the State, and by this time next year the outside world will commence to learn that there is such a place in California as Humboldt County. Having increased from 27,104 to 33,857 in the last ten years under our present conditions, who can foretell what our population will be at the end of the next ten years, with railroad connection with the rest of the country?

While the greater portion of the county's surface is hilly, there is considerable level land around Humboldt Bay and along the numerous rivers which flow down the mountains to the ocean. All of this land, both hill and dale, is very fertile and productive, and is principally utilized for farming, dairying, and fruit raising. While fruit raising, at this time, is in its infancy, with a railroad outlet in a short time it will be its chief industry. The fact has been well established that here can be raised as good fruit of all kinds as in the State. Fruit grown here is nearly altogether free from insect pests; the codling moth, which is so ruinous to the apple business in a great many localities, is wholly unknown here.

Considerable over one hundred thousand boxes of choice apples are annually shipped out of the county. A great variety of berries grow in profusion in all parts where cultivated, and immense quantities of wild blackberries, huckleberries, and strawberries grow in almost every section of the county.

Humboldt County, while not particularly noted as an agricultural county, yields perhaps the largest returns per acre of vegetables, hay and grains, of any locality on the Pacific coast. No year has yet been seen when this county has had too little rainfall for its needs or enough to damage its crops. The average rainfall being 47.55 inches per annum.

There are abundant streams and springs throughout the county, which furnish plenty of pure water to its inhabitants the year around and render irrigation absolutely unnecessary.

Lumbering is the chief industry of the county, the exports of our lumber and shingle mills, and sash and door factories aggregating 250,000,000 feet yearly besides that which is used at home, which is considerable. There are over 5,000,000 acres of heavily timbered land on which there is estimated to be over 50,000,000 feet.

Stock raising is carried on extensively throughout the county, and

is one of its most important industries. The exports of this business bringing in about $500,000 annually.

The growing of wool is also an important industry, exports being nearly 600,000 pounds per year.

Gold mining is carried on to some extent along the Klamath and Trinity rivers, the annual output being over $100,000.

Good building stone, such as granite and sandstone, is found in many localities. All the granite used in our court house being a home product.

Among other industrial pursuits carried on within the county are shipbuilding, salmon fishing, leather making and the gathering of tanbark.

There are three daily, seven weekly, and one semi-weekly newspapers published in the county.

We have 122 public schools and employ about 200 teachers. Of the above four are high schools. There are about sixty churches in the county.

Two notable buildings have been finished within the last year at Eureka, namely a Federal building, just completed at a cost of $118,000 and the most beautiful "Elk's Home" in the State.

STATISTICS OF HUMBOLDT COUNTY, 1909-10.

General Statistics.

Area 3,507 square miles, or 2,244,480 acres.	
Number of acres assessed	1,600,502
Value of country real estate	$17,053,210
Of improvements thereon	$1,250,660
Of city and town lots	$4,693,425
Of improvements thereon	$2,898,125
Of personal property	$3,253,757
Total value of all property	$29,149,177
Expended for bridges, last fiscal year	$23,500
Number of miles of public roads	1,200
Road levy per $100, 1910	60c
Value of county buildings	$375,000
Railroads, steam — miles, 145; assessed value	$1,149,170
Railroads, electric — miles, 12; assessed value	$65,450
Electric power plants — 2; assessed value	$156,513
Electric power lines—miles, 92; assessed value	$49,680
Pacific Telegraph & Telephone Company's property	$36,676
Western Union's property	$4,215

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	115,000	20,000	135,000
Apricot	50	.....	50
Cherry	2,000	1,000	3,000
Fig	25	.....	25
Lemon	3	.....	3
Peach	2,000	500	2,500
Pear	1,800	400	2,200
Plum	500	100	600
Prune	15,000	500	15,500
Quince	300	200	500
Total fruit	136,678	22,700	159,378
Chestnut	15	.....	15
Walnut	420	.....	420
Total nut	535	.....	535
Grapevines			500
Berries, acres			350

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	11,500,000	$175,000
Apricots	4,000	80
Blackberries	400,000	18,000
Beans	14,000	420
Beets	700,000	3,200
Cabbage	220,000	3,300
Celery	24,000	1,200
Cauliflower	26,000	7,800
Corn	40,000	2,000
Currants	4,000	160
Cherries	54,000	2,700
Gooseberries	4,000	200
Grapes	4,400	85
Loganberries	8,000	480
Onions	6,000	120
Pears	68,000	1,360
Peaches	105,000	2,100
Peas	40,000	1,200
Plums	10,000	2,100
Irish potatoes	6,200,000	48,500
Prunes	640,000	4,800
Quinces	6,500	195
Raspberries	7,000	560
Strawberries	80,000	8,000
Tomatoes	350,000	7,100
Totals	20,514,900	$290,660

Dried—	Pounds.	Value.
Apples	50,000	$2,500
Beans	9,000	270
Prunes	30,000	1,500
Walnuts	3,000	450
Totals	92,000	$4,720

Wines, Brandies, Etc.

	Gallons.	Value.
Beer (barrels)	15,230	.....
Cider	43,275	$6,491
Vinegar	28,400	5,680

Number of breweries, 1.

STATISTICS OF HUMBOLDT COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Bushels.	Value.
Wheat	165	4,950	$4,950
Barley	615	24,600	14,760
Oats	1,840	64,400	30,912
Total cereals	2,620	93,950	$50,622
	Acres.	Tons.	Value.
Alfalfa hay	212	1,272	$19,080
Grain hay	5,220	10,440	125,280
Grass hay	.....	6,370	63,700

Fish Industry.

	Pounds.	Value.
Salmon	2,340,000	$107,090
Other kinds	101,380	10,138
Totals	2,441,380	$117,138

Dairy Industry.

	Production.	Value.
Butter (pounds)	4,600,000	$1,610,000
Cheese (pounds)	200,000	40,000
Condensed milk (lbs.)	1,199,260	167,896
Casein	500,000	50,000

Creameries, 12; skimming stations, 15.

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	1,100,000	.....
Various kinds (acres)	188,000	$940,000
Pine (acres)	464,500	2,323,500
Redwood (acres)	447,500	8,950,000
Sawmills (number)	18	.....
Fuel, wood (cords)	70,000	210,000
Laths (thousand)	17,000	42,500
Lumber (feet)	265,550,000	$3,982,250
Pickets (pieces)	84,000	1,680
Piles	3,940	11,820
Posts (pieces)	87,300	10,476
Railroad ties (pieces)	468,000	.....
Sash and door factories (number)	7	.....
Shakes (thousand)	15,450	154,500
Shingles (thousand)	725,000	1,087,500
Stave bolts (cords)	1,800	14,400
Total value		$5,516,126

Power used for mills and manufactories in county—Steam (number), 95; electrical (number), 5.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	3,590	$125,650
Stock	22,145	332,175
Dairy Cows—Graded	16,681	667,240
Thoroughbred—Holsteins	90	9,000
Jersey	360	36,000
Calves	10,135	101,350
Swine	6,145	61,450
Horses—Thoroughbred	5	5,000
Standard-bred	420	42,000
Common	5,840	358,400
Colts	820	24,600
Mules	345	13,800
Sheep	66,500	199,500
Lambs	25,200	50,400
Angora goats	250	7,500
Common goats	2,800	8,400
Total stock	161,326	$2,042,465
Wool (pounds)	591,050	$153,870

Poultry and Eggs.

	Dozen.	Value.
Chickens	6,410	$32,050
Ducks	215	1,290
Geese	84	756
Turkeys	307	4,605
Eggs	500,000	150,000
Total value		$188,701

Miscellaneous Products.

Bees (hives)—Number, 500; value, $1,500.

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	3	20	$60,000
Cigars	8	33	90,000
Confectionery	5	.....	.....
Cooper-shops	2	.....	.....
Foundries and iron works	3	98	220,000
Marble	2	.....	.....
Tanneries	3	.....	200,000
Tiling	2	.....	.....
Woolen mills	1	.....	.....

Manufactured Output.

	Quantity.
Cigars (thousand)	16,000
Hides (pounds)	45,000
Lard (pounds)	800,000
Tallow (barrels)	100

IMPERIAL COUNTY.

Imperial is the youngest county in the State, having been formed in 1907 from the eastern part of San Diego County, formerly known as the "Colorado Desert, or Imperial Valley." The progress of the county is practically confined to the central part of the valley.

Dairying is very profitable, owing to the fact that we have alfalfa growing throughout the winter, that furnishes an abundant supply of green pasturage. We have modern creameries with latest appliances, that are located in different sections. The stock used for dairying purposes is of a very high grade, mostly pure-bred representatives of the milk strains.

Imperial Valley is one of the best stock, hog and poultry producing countries in the West, and there are also various other industries which are receiving considerable attention.

There is reason to believe that the cultivation of cotton may hold a most important part in the industrial development of Imperial County, and those interested feel greatly encouraged over the outlook.

The center of this wonderfully fertile valley is reached by a spur from the main line of the Southern Pacific Railroad.

The most important towns of the valley are Imperial, El Centro, Holtville, Brawley, and Calexico. There are located in these towns seven strong banking institutions. The hotel accommodations are excellent, and there are a number of sunny modern lodging houses. The school and church accommodations of the valley are excellent.

Imperial Valley is 110 miles long by 40 miles wide, half in California, half in Mexico. Present irrigated area, 40 by 25 miles in California.

Irrigated from Colorado River; 50,000 miner's inches are available.

Area of irrigable land in Imperial County, 400,000 acres. In cultivation, 200,000 acres.

Length of canals, about 600 miles. Average rainfall, 4.4 inches.

STATISTICS OF IMPERIAL COUNTY, 1909-10.

General Statistics.

Area 4,000 square miles, or 2,560,000 acres.	
Number of farms	42,000
Number of acres assessed	621,953
Value of country real estate	$6,029,669
Of improvements thereon	$285,043
Of city and town lots	$1,388,385
Of improvements thereon	$586,255
Of personal property	$1,314,214
Total value of all property	$9,603,566
Expended on roads, last fiscal year	$48,798
Expended for bridges, last fiscal year	$26,012
Number of miles of public roads	1,250
Road levy per $100, 1910	40c
Value of county buildings	$25,000
Irrigating ditches — miles, 900; cost	$3,500,000
Railroads, steam — miles, 160; assessed value	$3,380,349
Telegraph—miles, 271; assessed value	$38,448
Electric power plants — 1; assessed value	$70,640
Electric transmission lines—miles, 34; assessed value	$31,800
Number of acres irrigated	207,360
Telephone—miles, 84; assessed value	$2,000

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Tons.	Value.
Wheat	512	10,333	$12,400
Barley	46,073	1,298,500	737,160
Oats	124	6,118	1,960
Rye	235	7,720	2,760
Corn	5,127	170,900	102,540
Total cereals.	52,071	1,493,571	$856,820
	Acres.	Tons.	Value.
Alfalfa hay	32,703	.....	$1,187,208
Grain hay	1,354	.....	18,248
Total hay	34,057	.....	$1,205,456

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Asparagus	510,000	$102,000
Grapes	6,000,000	120,000
Onions (12 acres)	96,000	1,920
Egg plant	64,000	1,920
Cantaloupe (crates), 1,200 acres	120,000	250,000
Total value		$472,840

Dairy Industry.

	Production.	Value.
Butter (pounds)	2,738,425	$958,349

STATISTICS OF IMPERIAL COUNTY, 1909-10—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	119	149	268
Apricot	4,149	11,086	15,235
Cherry	43	157	200
Fig	475	1,075	1,551
Lemon	250	497	747
Olive	100	2,090	2,190
Orange	300	2,098	2,398
Peach	285	966	1,251
Pear	365	2,786	3,151
Plum	859	60	919
Prune	65	379	444
Quince	2,250	902	3,152
Other kinds	.....	.....	282
Total fruit	9,260	22,528	31,788
Grapevines (acres)			1,000
Cottonwood trees			100,000
Eucalyptus trees			359,299

Poultry and Eggs.

	Dozen.	Value.
Chickens	2,673	$13,365
Turkeys	171	2,052
Eggs	127,680	31,920
Total value		$47,337

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,380	$27,600
Stock	4,729	94,580
Dairy Cows—Graded	8,640	432,000
Thoroughbred	150	9,000
Ayrshire, common	746	29,840
Calves	2,129	11,317
Swine	34,292	342,920
Horses—Thoroughbred	30	7,500
Standard-bred	2,480	372,000
Common	2,290	171,900
Colts	920	46,000
Jacks and jennies	4	850
Mules	1,382	138,200
Sheep	14,755	44,265
Lambs	1,100	1,100
Total stock	75,027	$1,729,072
Wool (pounds)	140,000	70,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	2	60	$152,400
Confectionery	10	14	62,250

Power used for mills and manufactories in county—Steam (number), 6; electrical (number), 1; water (number), 1; gasoline cotton gins (number), 5.

Manufactured Output.

	Pounds.	Value.
Bees (hives)—Number	2,528	$12,640
Beeswax	5,750	1,440
Cotton	4,500,000	685,000
Honey	690,000	41,400
Cotton seed	9,000,000	90,000

KERN COUNTY.

Kern County, lying in the southern end of the San Joaquin Valley, its easterly boundary extending on to the Mojave Desert over the extreme southerly end of the Sierra Nevada Mountains, is the second largest county in the State and probably has the most diversified resources of any.

At Randsburg, on the eastern border, is one of the largest gold mines on this coast, and the country around Randsburg has many smaller mines that are free-milling ore, which make them paying properties for people or corporations of small means.

Along the southern border where the line crosses the San Emidio Mountains are large deposits of iron ore and antimony, which are yet undeveloped, and along the western side of the county are the Sunset, Midway, and McKittrick oil fields, lying along the eastern base of the Coast Range Mountains, and which promise to yield untold wealth in their future production of oil.

In the northern part of the county, and surrounding the town of Delano, is a large body of good land which is now attracting considerable attention from investors, as development has shown that within a few feet of the surface lies an unlimited quantity of water, which can be raised to the surface to transform the arid plains into orchards and alfalfa fields.

In the northeastern part of the mining town of Kernville, surrounded by good mines, and near it on the south fork of the Kern River is the South Fork Valley, where numerous prosperous stockmen have their alfalfa fields that furnish feed to the stock that pasture in the high Sierras in the summer time.

In the center and surrounding the town of Bakersfield, the county seat, lie thousands of acres of fertile land that are irrigated by Kern River, and which are mostly used to raise stock and alfalfa, but will produce anything that can be raised where there is good land and an abundance of sunshine.

The Federal census, as just reported, furnishes convincing proof as to the marvelous growth of Kern County, the figures being 37,715, a gain of 128.85 per cent over the census of ten years ago. This growth was not confined to any one section of the county, though greatest in the oil fields and Bakersfield, but the valley farming section showed a great increase. Nor is such growth confined to the irrigated lands, a big increase being noted in the territory dependent upon raising water from the subterranean streams.

The details set forth in the following report compared with the figures of previous years tell the story of increasing acreage cultivation which promises a greater output in cereals, fruits and alfalfa than every before.

In the oil fields the development work is continuous, besides the proven territory where the work is steadily progressing, an entirely

new field, Lost Hills, is being exploited and the discoveries there indicate that the petroleum bearing territory is continuous from Sunset to the north line of the county.

Conditions affecting labor are most favorable. The rapid upbuilding of Bakersfield is furnishing employment to many skilled laborers and in the oil fields thousands of men are at work at remunerative wages. The increase in farm products, the larger oil output and big pay rolls are all contributing to the continuous prosperity of the county, and promise to make for still greater progress in the future.

STATISTICS OF KERN COUNTY, 1909-10.

General Statistics.

Area 8,100 square miles, or 5,184,000 acres.	
Number of farms	1,500
Number of acres assessed	2,987,753
Value of country real estate	$24,325,739
Of improvements thereon	$4,329,605
Of city and town lots	$2,443,826
Of improvements thereon	$2,683,690
Of personal property	$11,908,548
Total value of all property, including railroad	$52,350,546
Expended on roads, last fiscal year	$103,585
Expended for bridges, last fiscal year	$15,790
Number of miles of public roads	1,600
Road levy per $100, 1910	35c
Value of county buildings	$267,000
Irrigating ditches — miles, 209; cost	$447,090
Railroads, steam—miles, 544.54; assessed value	$6,659,138
Railroads, electric — miles, 7½; assessed value	$58,500
Electric power plants — 3; assessed value	$2,506,590
Electric power lines—miles, 144½; assessed value	$473,820
Number of acres irrigated	140,000

Total value of all property includes railroads, by State board.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	1,200	5,000	17,000
Apricot	25,000	.....	25,000
Cherry	1,000	.....	1,000
Fig	1,000	.....	1,000
Lemon	500	500	1,000
Nectarine	1,000	.....	1,000
Olive	5,000	.....	5,000
Orange	6,500	20,000	26,500
Peach	50,000	8,000	58,000
Pear	1,500	.....	1,500
Plum	6,000	.....	6,000
Prune	41,000	.....	41,000
Quince	500	.....	500
Other kinds	200	.....	200
Total fruit	151,200	33,500	184,700
Almond	2,500	.....	2,500
Pecan	200	.....	200
Walnut	250	.....	250
Total nut	2,950	.....	2,950
Grapevines	1,100	.....	1,100
Berries, acres.	65	.....	65

Dairy Industry.

	Production.	Value.
Butter (pounds)	557,980	$178,000

Creameries, 3.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apricots	600,000	$6,000
Oranges (boxes)	12,000	18,000
Peaches	400,000	3,000
Totals	1,012,000	$27,000
Dried—	**Pounds.**	**Value.**
Almonds	40,000	$2,800
Apricots	20,000	14,000
Peaches	240,000	9,600
Prunes	120,000	3,600
Raisins	920,000	23,000
Totals	1,340,000	$53,000
Canned—	**Cases.**	**Value.**
Apricots	800	$2,520
Grapes	100	290
Pears	50	370
Peaches	2,100	7,350
Plums	75	225
Totals	3,125	$10,755

Live Stock Industry.

	Number.	Value.
Cattle—*Beef	28,000	$1,120,000
Stock	62,000	1,240,000
Dairy Cows—Graded	3,300	115,500
Calves	10,000	100,000
Swine	10,000	110,000
Horses—Thoroughbred	17	16,000
Common	8,500	750,000
Colts	1,100	50,000
Mules	1,700	170,000
Sheep	180,000	810,000
Lambs	90,000	180,000
Total stock	394,615	$4,661,500
Wool (pounds)	1,900,000	190,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Value.
Wheat	10,000	$160,000
Barley	33,000	332,500
Corn	7,000	134,400
Total cereals	50,000	$626,900
	Tons.	**Value.**
Alfalfa hay	18,500	$185,000
Grain hay	15,000	180,000
Total hay	33,500	$365,000

*The beef cattle were mostly shipped out of the county, many of them having been shipped into the county for feeding purposes.

STATISTICS OF KERN COUNTY, 1909-10—Continued.

Poultry and Eggs.

	Dozen.	Value.
Chickens	6,000	$24,000
Ducks	200	1,200
Geese	40	400
Turkeys	500	7,500
Eggs	300,000	60,000
Total value		$93,100

No mention made in the above except poultry farms.

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	1	50	$55,925
Cigars	2	20	24,210
Confectionery	2	6	32,000
Flouring mills	1	15	101,088
Foundries and iron works	3	102	325,000
Lime	3	75	75,000
Meat products—			
Hides	..	.....	72,795
Tallow	..	.....	29,370

Manufactured Output.

	Quantity.
Brick (thousand)	6,990,748
Cigars (thousand)	538,000
Flour (barrels)	18,720
Lime (barrels)	90,000
Hides (pounds)	739,645
Tallow (pounds)	383,155
Soap (pounds)	70,000

Forest Products.

Area of timber lands 10,000 acres, not owned by the government; mostly pine.
Sawmills, 2.
Lumber, 650,000 feet, value $13,000.
Two small mills to supply the demand in the mountain districts.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives)—Number	8,000	$32,000
Beeswax	2,000	500
Flowers and plants (acres), roses	30	15,000
Honey	192,000	9,200
Alfalfa seed	140,000	21,000

LAKE COUNTY.

By her sister counties, Lake has long been cheerfully accorded the title of "The Switzerland of America," owing to her beauty of scenery. The county is located in the heart of the Coast Range, about 100 miles north of San Francisco, and is about 75 miles long and 25 miles wide. Mount St. Helena guards the southern extremity. Clear Lake is a splendid sheet of fresh water 25 miles long and from 2 to 10 miles broad; with the lake surface at an elevation of 1,350 feet about sea level, and having a depth sufficient to float vessels of considerable tonnage and draft, receiving in its basin the waters from several streams of considerable flow. It is stocked with an amazing wealth of native food fishes and bordered by smiling valleys of great fertility, by orchards of luscious fruit, by gently swelling slopes, by rugged mountains, by wild canyons, touched with a certain savage beauty, and bearing upon its heaving breast a constantly increasing proportion of the internal commerce of the community. Clear Lake is the pride of Lake County, as well as the source of its name.

Although classed as mountainous, Lake County has a number of very fertile valleys, some of them being of large area. Artesian water is obtainable in profuse quantities, and with comparatively small outlay of money or effort. Fields are growing luxuriant crops of grain, though annually sown in the same crop for more than a half century. A variety of soils is found throughout the county, and even the valleys show differences. Generally, the valleys are rich with alluvium, but in places there are extensive tracts of adobe, black and heavy, and apparently inexhaustible in productiveness. Occasionally, a sandy loam is found in the valleys, especially in the neighborhood of the streams traversing the county at short intervals. On the plateau crowning the low foothills which ring the valleys is a lighter soil, and when cleared is capable of raising large vineyards and orchards of peaches, prunes, etc. The rocky hillsides furnish pasture for flocks of Angora goats.

Large bodies of sugar and yellow pine, fir, cedar, and oak give employment to several sawmills and furnish the home market a good quality of lumber.

The minerals have heretofore been represented by the quicksilver industry, although gold, silver, copper, and oil have been discovered in small quantities. Besides quicksilver, immense quantities of mineral water have been bottled at the many mineral springs and shipped to all parts of the country. The several mineral springs are the sites for as many health resorts, as many as thirty thousand guests being entertained from all parts of the country each summer. Some of them go to the resorts for their health, the bright, clear atmosphere being very beneficial, and the waters frequently having a highly curative property in certain complaints. Others seek the deer, the fishing, and other sports. Among the resorts are Bartlett, Highlands, Adams, Harbin, Zeigler, Witter, and Anderson Springs; Blue Lakes, Laurel Dell,

Hobergs, Soda Bay, Glenbrook, Carlsbad, Saratoga, Bonanza, Astorg. England, Howard, and Bynum.

There are several mines from which large amounts of quicksilver have been taken. Natural gas is found. There are large deposits of sulphur and of borax in some parts of the county.

STATISTICS OF LAKE COUNTY, 1909-10.

General Statistics.

Area 1,332 square miles, or 852,480 acres.

Number of farms	1,008
Number of acres assessed	365,429
Value of country real estate	$2,057,722
Of improvements thereon	$528,850
Of city and town lots	$247,845
Of improvements thereon	$282,450
Of personal property	$380,676
Total value of all property	$3,646,189
Expended on roads, last fiscal year	$15,738
Expended for bridges, last fiscal year	$5,605
Number of miles of public roads	589
Road levy per $100, 1910	50c
Value of county buildings	$32,500
Irrigating ditches (miles)	17
Electric power plants (number)	1
Electric power lines (number)	3
Number of acres irrigated	160

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	3,933	79,326	$70,066
Barley	3,566	92,953	82,354
Oats	1,185	21,211	18,754
Rye	5	130	150
Corn	343	13,656	7,320
	Acres.	**Tons.**	**Value.**
Alfalfa hay	1,520	7,175	$34,800
Grain hay	4,143	5,875	55,900
Grass hay	1,015	1,230	10,650

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,582	$51,805
Stock	3,563	71,260
Dairy Cows—Graded	790	24,700
Calves	1,280	9,200
Swine	6,030	51,125
Horses—Thoroughbred	7	8,000
Standard-bred	102	16,000
Common	1,820	117,500
Colts	425	14,850
Jacks and jennies	22	3,050
Mules	220	22,500
Sheep	9,205	30,252
Lambs	2,620	5,825
Common goats	9,882	24,240
Wool (pounds)	65,830	$12,206
Mohair (pounds)	35,020	8,180

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	48,000	$240,000
Sawmills (number)	9	12,500
Charcoal (sacks)	150	100
Fuel, wood (cords)	5,860	25,440
Lumber (feet)	2,036,000	36,000
Posts (pieces)	6,100	615
Sash and door factories (number)	1	5,000
Shakes	80,000	1,200

Power used for mills and manufactories in county—Steam (number), 16; electrical (number), 4; water (number), 3.

Dairy Industry.

	Production.	Value.
Butter (pounds)	100,500	$37,135
Cheese (pounds)	154,750	37,117

Creameries, 5.

Poultry and Eggs.

	Dozen.	Value.
Chickens	2,171	$9,080
Ducks	29	145
Geese	19	235
Turkeys	550	16,500
Eggs	213,210	42,642

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	19,650	1,050	20,700
Apricot	2,570	115	2,685
Cherry	1,135	115	1,250
Fig	475	100	575
Nectarine	215	25	240
Olive	3,760	200	3,960
Orange	193	4	197
Peach	4,970	275	5,245
Pear	41,690	8,625	50,315
Plum	1,997	100	2,097
Prune	57,750	1,000	58,750
Quince	260	20	280
Almond	9,250	700	9,950
Chestnut	21	.....	21
Pecan	10	.....	10
Walnut	1,690	1,080	2,770
Other nuts	315	.....	315
Grapevines	394,640	43,600	438,240
Berries, acres.	28	.....	28

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	2,214,450	$13,024
Apricots	26,000	685
Blackberries	29,000	1,190
Beans	15,250	710
Beets	61,000	310
Cabbage	29,600	760
Celery	4,000	200
Cauliflower	2,000	100
Corn	67,000	590
Currants	200	10
Cherries	16,000	890
Figs	11,600	272
Gooseberries	2,000	50
Grapes	950,000	2,500
Loganberries	6,700	429
Nectarines	8,400	223
Onions	18,000	360
Olives	20,000	500
Pears	1,271,000	22,505
Peaches	131,300	2,686
Peas	5,000	300
Persimmons	400	10
Plums	11,000	150
Irish potatoes	727,500	9,805
Quinces	7,100	121
Raspberries	3,500	205
Strawberries	17,500	1,490
Tomatoes	87,500	1,045
Dried—	**Pounds.**	**Value.**
Almonds	74,800	8,340
Apples	22,000	1,320
Beans	2,000	100
Onions	44,000	720
Pears	611,600	55,044
Peaches	2,400	200
Plums	25,000	500
Prunes	1,476,000	38,580
Walnuts	11,500	1,245
Yerba Santa	40,000	800
Canned—	**Cases.**	**Value.**
Beans	30,000	67,500

STATISTICS OF LAKE COUNTY, 1909-10—Continued.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	51,150	$4,680
Sweet wines	150	30
Vinegar	1,100	250

Number of wineries, 12.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	275	$500
Honey	6,500	812
Hops	30,000	3,000
Alfalfa seed	240,410	30,369
Clover seed	200	40
Mineral water	40,000	167,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	2	6	$1,700
Cigars	1	.....	600
Confectionery	1	1	500
Flouring mills	3	7	52,502
Hides	..	.....	10,000
Planing mills	3	5	6,000
Quicksilver	2	28	58,725

Manufactured Output.

	Quantity.
Flour (barrels)	8,745

LASSEN COUNTY.

Lassen County lies in the northeastern part of California along the Nevada line. It is traversed from south to north by the Nevada-California-Oregon Railway (narrow gauge), which connects at Reno, Nevada, with the Southern Pacific system. Susanville, the county seat, is in Honey Lake Valley, a little south of the center of the county. Lassen embraces large areas, comprising rich valley lands, suited to agriculture; rolling hills and uplands, affording splendid range for stock; and mountain table-lands covered with timber.

The county two years ago had a population of only about 5,000. It could easily support many times that number. The assessment roll now foots over five and a half millions. The county has no debt, and the tax rate is low. The people are generally well-to-do and prosperous. The bank at Susanville, with a capital of $50,000, has more than $300,000 on deposit, which shows a condition of easy finances.

The principal present industries are farming and stock raising. There are paying mines in the county, but as a whole Lassen is not mineral. Timber lands which are not in forest reserves are now generally held in private ownership, but as yet the manufacture of lumber has not been commenced. But farming and stock raising will always be the principal industries of the county. Climate and soil are particularly adapted to them.

The altitude of the largest, most fertile and most productive valleys, such as Honey Lake Valley, Big Valley, and Long Valley, is a little over 4,000 feet. Other large valleys, like Madeline Plains, Willow Creek Valley, and Secret Valley, are in the neighborhood of 5,000 feet above sea level. While the high valleys are not as well adapted to general farming as the lower ones, they are quite productive, and well suited to the stock raising business. The climate generally is similar to that of the northeastern states, so far as range of temperature is concerned, but our summer season is quite dry, making irrigation necessary as a rule. With irrigation, where the altitude is not too great, any of the ordinary products of the temperate zone can be produced in abundance and of fine quality. Apples, pears, cherries, peaches, apricots, and berries of all kinds do splendidly. Of farm products, alfalfa is probably the most important, though native grasses, timothy, and redtop are extensively raised.

Good hay and grass and pure cold water make the county an ideal one for dairying. There are a number of creameries in the county, and their product commands the top price in city markets.

Improved farm lands range in price from $25 to $100 or more per acre.

District schools are scattered all over the county. A county high school is located at Susanville. There are quite a number of churches in the county, including Methodist, Baptist, Catholic, and others. Three weekly newspapers are published—the Lassen Advocate and Lassen Weekly Mail at Susanville, and the Big Valley Gazette at Bieber.

Susanville is the largest town. It has a good and abundant water supply and good facilities for fighting fire. Its stores are well stocked, and goods are sold at reasonable prices. Business buildings, as a rule, are substantial, and residences handsome.

Lassen County has a range of temperature wide enough to give a

pleasing variety to the season. Health conditions are fine. Pulmonary diseases are very rare, and malaria almost unknown. There are still large quantities of land open for entry, which, with water for irrigation, will make good farms and homes. There is plenty of water to irrigate these lands.

STATISTICS OF LASSEN COUNTY, 1909-10.

General Statistics.

Area 4,690 square miles, or 3,001,105 acres.	
Number of farms	750
Number of acres assessed	802,910
Value of country real estate	$4,126,865
Of improvements thereon	$429,559
Of city and town lots	$89,590
Of improvements thereon	$117,432
Of personal property	$1,167,141
Total value of all property	$7,272,217
Expended on roads and bridges, last fiscal year	$40,000
Number of miles of public roads	1,300
Road levy per $100, 1910	40c
Value of county buildings	$47,000
Irrigating ditches (miles)	150
Railroads, steam—miles, 165.58; assessed value	$1,137,161
Number of acres irrigated	30,000

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Tons.	Value.
Wheat	12,000	4,500	$135,000
Barley	3,000	1,000	30,000
Oats	2,500	800	20,000
Rye	1,500	600	24,000
Corn	60	.....	1,200
Total cereals	19,060	6,900	$210,200
Alfalfa hay	20,000	80,000	$400,000
Grain hay	1,200	3,000	16,000
Grass hay	90,000	150,000	600,000
Total hay	111,200	233,000	$1,016,000

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	100,000	$2,000
Apricots	6,000	120
Asparagus	300	30
Blackberries	2,500	200
Beans	1,200	50
Beets	20,000	450
Cabbage	75,000	1,500
Celery	1,000	140
Cauliflower	2,000	40
Corn	20,000	400
Currants	2,500	50
Gooseberries	1,000	30
Grapes	500	30
Loganberries	200	20
Nectarines	1,000	30
Pears	7,000	200
Peaches	30,000	800
Plums	6,000	60
Irish potatoes	6,600,000	132,000
Sweet potatoes	500	25
Prunes	1,200	30
Quinces	500	5
Raspberries	7,000	500
Strawberries	1,500	150
Tomatoes	50,000	1,250
Totals	6,942,900	$140,310

Dairy Industry.

	Production.	Value.
Butter (pounds)	500,000	$140,000
Cheese (pounds	80,000	.....

Creameries, 4.

Poultry and Eggs.

	Dozen.	Value.
Chickens	1,500	$9,000
Ducks	20	200
Geese	10	240
Turkeys	500	12,000
Total value		$21,440

Live Stock Industry.

	Number.	Value.
Cattle—Beef	9,000	$360,000
Stock	35,000	700,000
Dairy Cows—Graded	150	6,000
Calves	10,000	80,000
Swine	3,000	21,000
Horses—Thoroughbred	21	63,000
Standard-bred	76	22,800
Common	7,500	750,000
Colts	1,565	31,300
Jacks and jennies	75	7,500
Mules	300	30,000
Sheep	29,000	87,000
Lambs	25,000	50,000
Angora goats	500	2,000
Common goats	500	1,200
Total stock	121,687	$2,212,100

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	240,000	$2,500,000
Sawmills (number)	10	30,000
Lumber (feet)	4,500,000	60,000
Posts (pieces)	15,000	1,500
Railroad ties (pieces)	100,000	.....
Sash and door factories (number)	1	.....
Total value		$2,591,500

Power used for mills and manufactories in county—Steam (number), 16; electrical (number), 1; water (number), 3.

Wines, Brandies, Etc.

Cider, 130 barrels. Beer, 500 barrels. Number of breweries, 1.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives)—Number	1,000	$1,200
Honey	2,000	200
Alfalfa seed	500,000	80,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Confectionery	2	4	.....
Flouring mills	3	8	$40,000
Furniture	1	1	.....
Jewelry	3	4	.....
Leather goods	2	4	.....
Planing mills	2	8	.....

Manufactured Output.

	Quantity.
Flour (barrels)	8,000

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	15,000	8,000	23,000
Apricot	500	250	750
Cherry	750	350	1,100
Nectarine	150	100	250
Peach	2,000	2,000	4,000
Pear	500	250	750
Plum	400	150	550
Prune	750	350	1,100
Total fruit			31,500
Walnut	100	50	150
Grapevines	250	150	400
Acres—			
Raspberries	15	10	25
Blackberries	15	15	30
Strawberries	15	10	25
Gooseberries	8	5	13
Loganberries	3	5	8
Dewberries	2	3	5
Currants	4	3	7

LOS ANGELES COUNTY.

In wealth, population, and resources Los Angeles is the most important county in southern California. There are two rivers in the county, the Los Angeles and the San Gabriel. During a large part of the year these are dry beds of sand, what little water they contain finding its way through the porous sand to the bedrock. In the winter they are dangerous streams. The Los Angeles River rises in the western part of the San Fernando Valley, about 12 miles northwest of the city, and flows easterly 18 miles to the Los Angeles pass. Its stream is fed all along by springs. Two other "rivers," the Pacoima and the Tejunga, join it in the San Fernando Valley. Turning south, it flows through the Los Angeles Pass, and on through the city.

Los Angeles County embraces within its limits a great variety of scenery and climate. Within its territory may be found the climate and scenery of almost every part of the State, from the cool and breezy seashore to the warm inland plains and bracing mountain tops. Of the area of the county, about four fifths is capable of cultivation, the remainder being mountainous. The shore line is 85 miles in length. Nine tenths of the population is within thirty miles of the ocean.

The marvelous growth which has been made during the past few years may be seen from the statement that, within the space of twenty-four years, the population of the county has increased more than tenfold, and the assessed valuation of property in proportion.

The chief industry is horticulture, the list of products including everything that can be grown in the State, and most everything that can be raised in semitropic countries. The area of land devoted to horticultural purposes is being rapidly extended as the large tracts are subdivided and improved.

The county is well provided with transportation facilities. A dozen lines of railroad center in Los Angeles City, tapping almost every section of the county, while coast steamships call regularly at the leading seaports.

Perhaps the most important enterprise for Los Angeles is the big breakwater by the Federal Government at San Pedro. By means of this breakwater the depth of water over the bar will be so increased as to permit ocean-going vessels to come to the wharves, and Los Angeles will then be able to compete for its share of the growing Oriental trade. Other shipping points of the county are Port Los Angeles, near Santa Monica, and Redondo.

The San Gabriel Valley, a choice section of Los Angeles County, has the Sierra Madre Range on the north. The mountains are grand and precipitous, inclosing the valley like a wall. This valley is the best known of any portion of southern California. Even before there was any "boom" here worthy of mention, lands in the valley commanded a comparatively high price. As with most attractive sections, the level-headed mission fathers discovered its advantages, and founded the San Gabriel Mission—whose church is still in good preservation—in 1771. Now railroads traverse the valley, and the land is rapidly being trans-

formed into a succession of small homes and thriving little cities. The valley contains 100 square miles of territory. The San Gabriel contains some of the choicest fruit lands in southern California, and is largely devoted to the raising of oranges and lemons, as well as deciduous fruits.

Pasadena, a beautiful city, is located at the foot of the Sierra Madre Range, about seven miles from Los Angeles. Within twenty years Pasadena has grown from a sheep pasture to a city of beautiful homes, with a world-wide reputation. Other settlements in the valley are Alhambra, Monrovia, Duarte, and Azusa, all of which are mainly supported by horticulture.

Adjoining San Gabriel Valley on the east is Pomona Valley. Irrigation is cheaply supplied to this section from the San Antonio River. The soil and climate are particularly adapted to the culture of citrus fruits. Railroad facilities are very good, and increasing, which has caused the valley to settle up rapidly. It contains a number of flourishing towns, the chief of which is Pomona, one of the most thriving cities of southern California. For miles in every direction around Pomona extend continuous orchards of oranges, lemons, apricots, peaches, prunes, olives, and other fruit trees, a specialty being made of olive culture.

Other important sections of the county are Los Nietos Valley, a well-watered district, noted for corn, alfalfa, and dairy products; the stretch of country between Los Angeles City and the ocean; San Fernando Valley, north of Los Angeles, in which a large amount of fine wheat is raised; and Antelope Valley, an elevated region in the northern part of the county, where land is cheap and, with water, very productive.

Los Angeles enjoys railroad competition in the shape of three transcontinental lines. The Pacific Coast Steamship Company runs vessels every few days from Los Angeles County ports to San Francisco and San Diego.

There is a great variety of soil in Los Angeles County, varying from light sandy loam to heavy adobe.

A mistaken idea prevails to some extent that farming is only carried on in Los Angeles County by means of irrigation, and that without it crops would be a failure. For grain and winter crops irrigation is not employed. Corn is irrigated in some localities, being a summer crop, but is successfully grown in many places without irrigation. Upon some lands, after a crop raised without irrigation has been harvested, another is raised by means of irrigation. On irrigated land two or three crops a year are frequently raised. With an artificial supply of water, the farmer is rendered independent of the season's rain, while the product of his land is enormously increased.

The development of the horticultural industry during the past few years has been remarkable. The most important horticultural product is the orange. Besides the orange and lemon, the principal fruits raised are the almond, fig, prune, apricot, walnut, peach, pear, and berries.

Deciduous fruits are shipped fresh, canned, dried, and crystallized. An active demand for our dried fruits has grown up in Europe.

Alfalfa, which is largely grown for hay, is a most remarkable forage plant. It is cut from three to six times a year. Large quantities of wheat and barley are raised. Corn sometimes grows to a height of

twenty feet. Pumpkins have been raised weighing over 400 pounds. There is a beet sugar factory at Alamitos. Los Angeles honey is celebrated all over the country. In the neighborhood of Los Angeles calla lilies, tuberoses, carnations, and other flowers are grown by the acre. Hundreds of acres are devoted to the cultivation of the celery, which is shipped East by the train load. Winter vegetables, such as string beans, tomatoes, green peas, and chili peppers, constitute a big business.

Until only a few years ago, most of the butter consumed in southern California was imported from the North and East. This is no longer the case, a number of creameries having been established during the past few years, with most successful results.

Poultry does well in Los Angeles County when it is given the same attention it receives in the East. Eggs always command a good price.

Ostriches are raised for their plumes, and the industry is profitable. There is a large ostrich farm at South Pasadena.

Among the game found in the country are wild geese, ducks, snipe, rabbits, squirrels, foxes, deer, wildcats, California lions, and bear, the latter being found in the northern part of the county.

The angler finds plenty of trout in the mountain canyons. In the ocean there is excellent fishing, both with line and seine, and some remarkable catches are made. The yellowtail, ranging from 15 to 80 pounds, is very numerous in the waters of the Pacific. The tuna attains a length of five feet or more, and a weight of from 100 pounds upward. "Jewfish" are sometimes caught weighing 400 pounds.

Although Los Angeles County is chiefly noted as a horticultural section, its mineral wealth is by no means unimportant. Including petroleum, it ranks fourth in mineral products among the counties, and is the only one which leads in five mineral products. Los Angeles is the center of a number of rich mineral fields in southern California which annually produce many millions of dollars.

One of the most remarkable features of development in Los Angeles County has been the greatly increased production of petroleum. For over twenty-five years petroleum has been produced on a limited scale in Los Angeles and Ventura counties, but it is only within the past few years that the industry has assumed great importance. The oil produced in California differs from that of the Eastern states, being of a heavier grade, with an asphaltum base, and it is used almost exclusively for fuel. It has been adopted by most of the leading factories of this section, and is used largely by the railroads. A careful test made with a locomotive showed that oil at $1 a barrel is equivalent to coal at $4 a ton.

The school facilities of Los Angeles are especially good. Besides the complete system of public schools, private schools and colleges abound in Los Angeles, Pasadena, and other towns. Many Eastern people avail themselves of the opportunity to send children with a tendency to weak lungs to a country where plenty of out-of-door exercise is a possibility every day in the year. Most of the leading religious denominations are represented, not only by scores of churches, but also by one or more religious colleges. The work of the schools is further supplemented by an army of specialists in music, painting, and every department of art. The Chautauqua has an active membership of nearly a thousand, and meets annually at Long Beach. Lectures and other entertainments, by

home and foreign talent, are of almost daily occurrence. The educational and social facilities afforded by Los Angeles are, in the widest sense of the word, unsurpassed. Public libraries are numerous and well stocked with the latest works.

Catalina Island is a most attractive and popular resort in the Pacific, just off the coast of Los Angeles County. Between this resort and Los Angeles City there is a most excellent rail and boat service.

STATISTICS OF LOS ANGELES COUNTY, 1909-10.

General Statistics.

Area 3,880 square miles, or 2,483,200 acres.

Number of farms	10,322
Number of acres assessed	1,025,109
Value of country real estate	$72,090,225
Of improvements thereon	$6,389,405
Of city and town lots	$251,712,990
Of improvements thereon	$110,092,830
Of personal property	$82,226,104
Total value of all property	$522,511,554
Expended on roads, last fiscal year	$645,275
Expended for bridges, last fiscal year	$47,772
Number of miles of public roads	4,220
Road levy per $100, 1910	60c
Value of county buildings	$2,349,846
Irrigating ditches—miles, 1,143; cost	$587,000
Railroads, steam and Pullman—miles, 617.520; assessed value	$8,889,005
Railroads, electric — miles, 567; assessed value	$15,761,125
Electric power plants — 8; assessed value	$1,938.658
Electric power lines—miles, 1,157.50; assessed value	$4,110,020
Number of acres irrigated	97,778

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	31,326	626,520	$601,472
Barley	58,000	1,288,889	800,400
Corn	14,000	270,000	266,490
Total cereals	103,326	2,185,409	$1,668,362

	Acres.	Tons.	Value.
Alfalfa hay	21,000	105,000	$945,000
Grain hay	116,600	174,900	2,011,350
Total hay	137,600	279,900	$2,956,350

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	141,070	20,362	161,432
Apricot	192,876	21,690	214,566
Cherry	3,289	830	4,119
Fig	86,600	2,100	88,700
Lemon	786,360	62,730	849,090
Nectarine	3,286	600	3,886
Olive	342,880	21,687	364,567
Orange	2,210,123	216,750	2,426,873
Peach	286,727	3,982	290,709
Pear	72,930	882	73,812
Plum	51,860	830	52,690
Prune	52,800	700	53,500
Quince	5,630	210	5,840
Total fruit	4,236,431	353,353	4,589,784
Almond	150,600	890	151,490
Chestnut	250	110	360
Pecan	1,800	.....	1,800
Walnut	310,300	81,812	392,112
Other nuts	290,600	.....	290,600
Total nut	753,550	82,812	836,362
Grapevines	5,693,000	.....	5,693,000
Berries, acres.	3,912	.....	3,912

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	3,232,100	$71,802
Apricots	4,900,000	98,000
Asparagus	8,000	800
Blackberries	1,114,285	66,857
Beans	1,320,000	46,200
Beets	345,000	3,450
Cabbage	6,830,000	68,300
Celery	910,000	18,200
Cauliflower	4,987,000	99,740
Corn (dozen)	287,000	43,375
Cherries	21,800	1,090
Figs	1,039,000	25,975
Gooseberries	41,000	2,460
Grapes	37,500,000	450,000
Grape fruit (boxes)	18,000	49,500
Lemons (boxes)	1,233,000	2,500,000
Loganberries	278,850	22,308
Nectarines	82,700	1,654
Onions	260,000	9,100
Oranges (boxes)	2,767,000	7,500,000
Pears	830,000	20,750
Peaches	5,600,000	76,600
Peas	1,700,000	68,000
Persimmons	8,000	467
Plums	2,100,000	42,000
Irish potatoes	7,670,000	115,050
Sweet potatoes	1,126,000	25,335
Prunes	800,000	20,000
Quinces	29,000	2,465
Raspberries	108,570	9,770
Strawberries	10,842,000	433,680
Tomatoes	12,500,000	125,000
Totals { pounds	106,183,305	
Totals { boxes	4,018,000	$12,013,928
Totals { dozens	287,000	

Dried—	Pounds.	Value.
Almonds	198,000	$31,680
Apricots	810,000	60,750
Beans	18,300,000	777,750
Onions	1,700,000	51,000
Peaches	782,000	70,380
Peanuts	6,000	390
Prunes	95,000	9,025
Raisins	983,000	32,766
Walnuts	9,800,000	1,568,000
Totals	32,674,000	$2,601,741

Canned—	Cases.	Value.
Apples	850	$1,900
Apricots	18,600	184,080
Blackberries	1,255	2,600
Beans	11,500	23,000
Grapes	180	450
Pears	41,770	134,570
Peaches	65,570	191,105
Plums	30,690	109,020
Strawberries	7,500	27,000
Tomatoes	87,160	258,150
Chilis	1,000	3,600
Pumpkin	1,500	5,400
Totals	267,575	$940,875

STATISTICS OF LOS ANGELES COUNTY, 1909-10—Continued.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	1,200,000	$300,000
Sweet wines	1,486,000	445,800
Beer (barrels)	216,444	1,455,552
Brandy	140,000	280,000
Vinegar	47,000	9,400

Number of wineries, 86; number of breweries, 3.

Dairy Industry.

	Production.	Value.
Butter (pounds)	4,962,000	$1,488,600
Cheese (pounds)	998,000	174,650

Creameries, 19; skimming stations, 9.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	5,872	$265,370
Stock	21,800	763,000
Dairy Cows—Graded	37,280	1,864,000
Thoroughbred—		
Guernsey	310	31,000
Herefords	250	25,000
Holsteins	400	40,000
Jersey	375	37,500
Shorthorns	150	11,250
Calves	12,200	146,400
Swine	21,830	327,450
Horses—Thoroughbred	1,080	263,000
Common	30,000	122,000
Colts	14,000	281,000
Jacks and jennies	350	3,500
Mules	7,816	468,960
Sheep	47,000	235,000
Lambs	21,000	78,750
Angora goats	680	6,800
Common goats	4,300	21,500
Total stock	228,403	$6,089,480
Wool (pounds)	322,000	48,300

Poultry and Eggs.

	Dozen.	Value.
Chickens	81,733	$588,477
Ducks	5,800	52,200
Geese	2,900	34,800
Turkeys	7,800	234,000
Eggs	3,836,655	1,150,996
Total value		$2,060,473

Forest Products.

Timber Lands — Cedar, oak, pine, mesquite, and redwood, 587,520 acres, mostly in forest reserve.

	Amount.	Value.
Fuel, wood (cords)	12,000	$96,000

Power used for mills and manufactories in county—Steam (number), 218; electrical (number), 782.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	62,000	$196,000
Beeswax	26,100	6,525
Flowers and plants (acres)	650	659,319
Honey	33,000	1,980
Alfalfa seed	30,000	5,000
Garden seed	2,780	11,750
Sugar beets (tons)	60,000	300,000

Fish Industry.

	Pounds.	Value.
All kinds	6,682,500	$400,950

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	18	260	$638,700
Paper boxes	5	230	475,000
Wood boxes	4	120	265,000
Brick	14	962	1,308,395
Brooms	3	35	105,600
Carriages and wagons	48	1,820	1,886,400
Cigars	67	324	650,000
Clothing	486	3,020	12,575,000
Coffee, spices, etc.	13	110	886,000
Confectionery	73	910	1,982,680
Cooper-shops	3	52	101,260
Crackers	3	388	942,345
Electrical supplies	22	306	982,000
Flouring and cereal food mills	7	253	3,221,057
Foundries and iron works	29	1,800	5,680,000
Furniture	23	200	620,000
Jewelry	42	280	789,200
Leather goods	22	283	620,000
Machinery	47	860	1,680,000
Meat products—			
Hides	..	.....	587,991
Lard	..	.....	864,595
Meat packed	5	770	5,314,949
Tallow	..	.....	135,000
Olive oil	5	86	356,000
Paper	1	15	50,000
Pickles	7	179	455,000
Pickled olives	4	86	240,000
Iron pipe	5	300	1,800,000
Sewer pipe	3	150	382,000
Planing mills	61	2,100	7,327,100
Potteries	8	153	270,000
Salt	3	76	100,700
Soap	5	218	914,569
Artificial stone	4	69	180,000
Granite	11	80	118,000
Syrups and extracts	9	67	210,000
Tanneries	2	25	230,000
Tiling	1	40	75,000
Tin and galvanized iron	42	200	710,208
Willow and wooden ware	2	50	110,000
Wood turning and carving	3	21	30,000

Manufactured Output.

	Quantity.
Brick (thousand)	141,224
Brooms (dozen)	22,000
Cigars (thousand)	10,000
Crackers (pounds)	8,000,000
Flour (barrels)	295,000
Hides (pounds)	4,231,009
Lard (pounds)	8,648,603
Meat packed (pounds)	65,787,941
Tallow (barrels)	5,987
Olive oil (gallons)	178,000
Pickles (gallons)	910,000
Salt (tons)	14,386
Soap (pounds)	8,255,000

MADERA COUNTY.

Madera County is in the center of the San Joaquin Valley, bounded on the north by Merced and Mariposa counties, on the southeast and west by Fresno County. The eastern portion of the county extends far up in the Sierra Nevada Mountains. From the foothills to the San Joaquin River, a distance of about forty miles, the land is level and adapted to all kinds of agricultural pursuits. The melting snows of the mountains flow through numerous small creeks, into the San Joaquin River, or serve to supply the farming section with water for irrigation. The higher mountains are heavily timbered with valuable wood, principally sugar and white pine. Lumbering, stock raising, quarrying, mining, fruit growing, and farming are the principal industries. There are two large wineries in the county. All kinds of fruit yield heavily on the irrigated lands. Minerals are iron, copper, gold, and silver. The power plant of the San Joaquin Light and Power Company is near North Fork, this county. The granite quarries at Knowles furnish employment to about 300 men. The product is said to be the best in the State. San Francisco post office and many other public and business buildings in various cities of the State are built of the granite from these quarries.

The county seat is Madera, and the other towns of the county are Raymond, Grub Gulch, Brenda, North Fork, Sugar Pine, O'Neals, Gold, Coarse Gold, Fresno Flats, Minturn, and Knowles.

STATISTICS OF MADERA COUNTY, 1909-10.

General Statistics.

Area 2,200 square miles, or 1,408,000 acres.	
Value of country real estate	$5,906,065
Of improvements thereon	$628,870
Of city and town lots	$355,940
Of improvements thereon	$301,990
Of personal property	$1,480,500
Total value of all property	$8,673,620
Expended on roads, last fiscal year	$25,309
Expended for bridges, last fiscal year	$9,444
Road levy per $100, 1910	35c
Irrigating ditches — miles, 130; cost	$45,000
Railroads, steam — miles, 77.4; assessed value	$130,505
Electric power plants — 1; assessed value	$106,570
Electric power lines (miles)	29

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	11,000	.....	11,000
Apricot	25,000	.....	25,000
Fig	1,500	1,000	2,500
Lemon	150	1,000	1,500
Olive	6,500	3,500	10,000
Orange	600	1,300	1,900
Peach	70,000	15,000	85,000
Quince	25	.....	25
Other kinds	10	.....	10
Total fruit	114,785	21,800	136,935
Almond	550	.....	550
Walnut	50	.....	50
Total nut	600	.....	600
Grapevines, acres	6,960	1,675	8,635
Berries, acres.	100	.....	100

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	500,000	$12,500
Olives	130,000	3,000
Totals	630,000	$15,500
Dried—	**Pounds.**	**Value.**
Almonds	5,000	600
Apricots	240,000	19,200
Peaches	900,000	47,250
Totals	3,645,000	$142,050

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Tons.	Value.
Wheat	100,000	11,000	$352,000
Barley	100,000	31,000	527,000
Oats	7,000	2,000	46,000
Corn	250	330	11,880
Total cereals	257,250	44,330	$936,880
Alfalfa hay	10,000	45,000	$400,000
Grain hay	4,000	6,000	72,000
Total hay	14,000	51,000	$472,000

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	1,500,000	$375,000
Brandy	10,000	20,000

Number of wineries, 2; number of distilleries, 2.

Dairy Industry.

	Production.	Value.
Butter (pounds)	1,000,000	$250,000

Creameries, 1.

STATISTICS OF MADERA COUNTY, 1909-10—Continued.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	12,000	$360,000
Stock	50,000	1,000,000
Dairy Cows—Graded	2,500	100,000
Thoroughbred—Holsteins	900	45,000
Calves	10,000	60,000
Swine	10,000	40,000
Horses—Thoroughbred	100	20,000
Common	4,900	392,000
Colts	1,300	32,500
Mules	3,100	310,000
Sheep	10,000	30,000
Lambs	4,000	4,000
Total stock	108,800	$2,393,500
Wool (pounds)	100,000	10,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	9,000	$27,000
Ducks	100	600
Turkeys	900	18,000
Total value		$45,600

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	75,000	
Cedar (acres)	4,000	
Pine (acres)	71,000	$1,875,000
Sawmills (number)	3	1,200,000
Lumber (feet)	15,000,000	1,140,000
Sash and door factories (number)	1	100,000
Total value		$4,315,000

Power used for mills and manufactories in county—Steam (number), 4; electrical (number), 1; water (number), 1.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	915	$2,755
Honey	50,000	5,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes		80	$150,000
Granite		300	500,000
Saw and planing mills		900	2,000,000
Sash and door factories.		125	300,000

MERCED COUNTY.

Merced County possesses as good land as is to be found anywhere in the San Joaquin Valley for fruit and alfalfa, but its development has been retarded by large land holdings, and grain growing has been the principal occupation. Within recent years, however, thousands of acres have been subdivided into colony lots and placed on the market, and vigorous advertising campaigns organized. This, of course, means immigration, development, and prosperity.

The good roads movement is receiving its due amount of consideration in the county, and the different supervisorial districts have built several miles of new roads, with the expectation of extending them as fast as possible. The county is particularly fortunate in being able to secure a high grade of road material from the near by rock crusher at Jasper, on the line of the Yosemite Valley Railroad, and at reasonable cost.

The new Yosemite Valley Railroad has its terminal facilities in the city of Merced, which include a general office building and depot, roundhouse, turntable, and switch yards. It is a standard gauge steam road. The line connects at Merced with the trunk lines of the Santa Fe and Southern Pacific, and extends to El Portal at the Yosemite National Park line, a distance of 78 miles. It is a picturesque route, following the course of the Merced River Canyon.

The road was built to handle the immense tourist travel to and from the celebrated Yosemite Valley, and Merced has become known as the gateway to Yosemite, on account of the thousands of tourists who pass through annually. Leaving the little city of Merced, the traveler is soon on the open plains, headed for the snow-capped Sierras that arise abruptly to the eastward. We get our first view of the beautiful Merced River and cross it just before reaching Hopeton. Another stretch of tangent track and a curve or two, and we round the outskirts of the old town of Snelling. This is the rich farming district of the Merced, as is shown by the herds of cattle and hogs, the orchards, the fields of alfalfa and Indian corn. The next stop is Merced Falls. Here we see a broad, smooth expanse of the river, and hear the roar as the water rolls over the falls.

On leaving this point we enter the Merced Canyon, and the ascent through the narrow gorge has commenced. We begin at once to notice the signs of the mining days of old, for the Merced was famous in that respect, and, for that matter, still has gold and other minerals along its course which are being actively mined. The Exchequer power plant and dam is the next mark of modern improvement, and just beyond a short distance is Pleasant Valley, so named from its surroundings. A bend in the river is passed, and we again cross the river. Of the many interesting sights in the canyon, the several waterfalls or dams are sure to attract attention. Bagby may be called the halfway station, and this pretty little mountain retreat, with its broad sheet of water pouring over the dam, the stamp mill and the power plant, has some history that takes us back to the early days when General Fremont erected here a stamp mill and christened it Benton Mill in honor of Senator Benton of

Missouri. A wagon bridge also spans the river here on the old road that connects Coulterville and Mariposa.

We now begin to realize more fully that we are penetrating deeper and deeper into the mountains, for the canyon walls shut us in completely and tower skyward, and we see nothing but huge mountain walls ahead and behind us. The track curves about each projecting abutment with the exact precision of the river. The water rushes over great bowlders and forms into many rapids and cataracts. Along here we see the mouth of the North and South Fork tributaries empty their rushing torrents from the distant snow-capped mountains and lakes and wonder at the awful chasms whence they issue.

We round another curve, completing almost a full circle of what is known as the "Hogback," when plainly up the canyon ahead of us, on the face of the mountain wall, we see the filmy sheet of water called the Chinquapin Fall, and opposite which and far below on the river's edge is El Portal, the end of the first part of the journey, and the commencement of the exciting and romantic stage ride of fourteen miles through the Yosemite Park. Away up in the mountains, an altitude of nearly two thousand feet, we find this picturesque, secluded resort, a fine large hotel with wide verandas, shut in on all sides by the mountains, with the wild rushing river before us. Here we may stop for rest and enjoyment, and proceed to Yosemite when we are ready to do so.

The stage ride through the Yosemite Park from El Portal is one of the principal features of the entire trip, for its beauty and grandeur are unsurpassed by any other road of equal length in America. The road continues along the ever-present river to the Portal of Yosemite, and the traveler is in a measure prepared for the sublimities of California's Wonderland, which burst on the view as the stages halt on the bank of the river for the first general view of the valley, where El Capitan rises abruptly three thousand three hundred feet high, the mighty guardian of the valley, with beautiful Bridal Veil Fall to the right with its nine hundred and forty feet of mist and rainbow effect. Ere we reach our hotel or camp, we have received our first general impression of the great valley. Its beauty and grandeur grow upon you. It is indescribable; it must be seen to be appreciated.

The creamery industry has developed so rapidly that Merced County is now near the head of the list in the production of cream.

Merced County excels in the quantity and quality of its sweet potatoes. The fig industry is yet in its infancy, but it has been proven that the soil and climatic conditions are very favorable, for the Government expert has pronounced this soil best for figs and olives. Also the peaches and grapes of Merced County have a State reputation.

The flour mills are producing an extra good quality of flour, so are rapidly increasing their outputs.

Merced County is located about the center of the State and also about the center of the San Joaquin Valley. Numerous rivers and creeks traverse the county, furnishing a natural water supply, while the county's system of artificial irrigation is one of the finest in the world. It has two systems, one on the east side and the other on the west side of the San Joaquin River. The main canal on the east side is 65 feet wide at the bottom and 100 feet wide on top and 10 feet deep, the carrying capacity being 4,000 cubic feet per second. The length of the canal

is about 50 miles, with something over 250 miles of subsidiary canals built as a part of the system, and these are constantly being added to as the demands require.

The canal on the west side is 40 miles in length with over 100 miles of lateral ditches, literally making an otherwise dry section "blossom as a rose." Lake Yosemite, the reservoir into which the canal empties, covers about a square mile, with the average depth of 36 feet.

STATISTICS OF MERCED COUNTY, 1909-10.

General Statistics.

Area 2,000 square miles, or 1,280,000 acres.

Number of farms	3,250
Number of acres assessed	1,164,958
Value of country real estate	$11,466,520
Of improvements thereon	$1,159,860
Of city and town lots	$647,595
Of improvements thereon	$997,020
Of personal property	$3,046,164
Total value of all property	$17,444,180
Expended on roads and bridges, last fiscal year	$79,019
Number of miles of public roads	1,090
Road levy per $100, 1910	55c
Value of county buildings	$221,250
Irrigating ditches — miles, 227; cost	$342,520
Railroads, steam—miles, 154.12; assessed value	$3,396,825
Electric power plants — 1; assessed value	$40,430
Electric power lines—miles, 18½; assessed value	$3,700
Number of acres irrigated	160,500

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	10,500	149,000	$93,423
Barley	85,425	1,390,000	600,480
Oats	15,340	244,960	117,580
Rye	6,100	23,833	14,872
Corn	3,525	44,643	31,250
Egyptian wheat	2,000	25,000	17,500
Total cereals	122,890	1,875,786	$875,105
	Acres.	Tons.	Value.
Alfalfa hay	23,100	45,025	$315,175
Grain hay	19,100	12,500	100,000
Total hay	42,200	57,525	$415,175

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	5,750	2,450	8,200
Apricot	8,250	9,125	17,375
Cherry	520	2,250	2,770
Fig	10,935	9,750	20,685
Lemon	750	350	1,100
Nectarine	610	50	660
Olive	4,100	3,300	7,400
Orange	2,825	5,200	8,025
Peach	148,441	380,150	528,591
Pear	4,250	9,210	13,460
Plum	200	108	358
Prune	9,200	2,150	11,350
Quince	500	750	1,250
Other kinds	50	100	150
Total fruit	196,431	424.943	621,374
Almond	21,750	11,500	33,250
Chestnut	20	25	45
Pecan	50	50	100
Walnut	950	900	1,850
Total nut	22,780	12,475	35,245
Grapevines	2,781,900	1,652,300	4,434,200
Berries (acres)—			
Black	40	30	70
Mammoth	20	5	25
Dew	7	2	9
Logan	35	10	45
Strawberries	20	5	25
Raspberries	3	1	4

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	53,225	$793
Apricots	98,250	1,473
Asparagus	5,100	255
Blackberries	165,350	8,267
Beans	365,250	18,262
Beets	67,000	670
Cabbage	110,150	1,101
Celery	13,250	265
Cauliflower	84,265	1,684
Corn	302,000	6,040
Cantaloupes	25,750	1,802
Figs	78,340	783
Grapes	7,967,000	63,818
Grape fruit	1,400	52
Lemons (boxes)	1,510	3,020
Loganberries	172,360	6,894
Nectarines	5,140	51
Onions	28,350	566
Oranges (boxes)	2,000	3,000
Olives	105,250	2,105
Pears	101,250	1,012
Peaches	1,108,900	11,089
Peas	41,260	824
Persimmons	2,000	80
Plums	107,250	1,072
Irish potatoes	630,100	6,301
Sweet potatoes	12,360,000	197,760
Pumpkins	4,530,000	6,745
Quinces	38,250	424
Raspberries	6,130	405
Strawberries	33,240	1,965
Tomatoes	115,700	578
Tomatoes (boxes)	70,000	24,500
Watermelons	1,650,000	5,200
Chili peppers	1,500	75
Totals	31,906,520	$378,931
Dried—	Pounds.	Value.
Almonds	83,450	$11,200
Apples	1,000	70
Apricots	150,600	10,542
Beans	210,300	14,721
Figs	504,200	20,168
Onions	120,100	1,800
Pears	2,350	164
Peaches	1,200,000	60,000
Peanuts	4,625	370
Plums and prunes	106,250	3,186
Raisins	113,800	455
Walnuts	3,500	437
Pecans	650	71
Totals	2,500,825	$123,184

Dairy Industry.

	No.	Production.	Value.
Skimming stations	6	6,601,250	$2,200,416
Butter (pounds)		283,308	94,436
Cheese (pounds)		229,875	36,780
Creameries, 2.			

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines (claret)	61,400	$9,210
Sweet wines (port)	91,000	22,750
Brandy	23,000	23,000
Vinegar	2,000	400

Number of wineries, 1; number of distilleries, 1.

STATISTICS OF MERCED COUNTY, 1909-10—Continued.

Live Stock Industry.

	Number.	Value
Cattle—Beef	5,275	$237,375
Stock	44,000	497,106
Dairy Cows—Graded	23,250	1,162,500
Thoroughbred	220	16,500
Calves	7,862	55,034
Swine	38,240	382,350
Horses—Thoroughbred	41	12,300
Standard-bred	4,375	218,750
Common	1,820	55,546
Colts	1,346	28,725
Jacks and jennies	120	12,000
Mules	2,340	351,000
Sheep	69,050	207,150
Lambs	30,100	60,200
Angora goats	700	1,750
Common goats	6,468	12,936
Total stock	235,207	$3,311,222
Wool (pounds)	552,400	44,192

Forest Products.

	Amount.	Value.
Fuel, wood (cords)	1,000	$5,000

Power used for mills and manufactories in county—Steam (number), 1; electrical (number), 1; water (number), 1.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	2,560	$5,120
Beeswax	2,250	607
Broomcorn	8,000	260
Honey	131,650	13,165

Poultry and Eggs.

	Dozen.	Value.
Chickens	6,150	$43,050
Ducks	250	1,500
Geese	53	636
Turkeys	1,935	58,050
Turkey eggs	1,400	2,800
Eggs	307,500	76,875
Total value		$182,911

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	2		$10,000
Flouring mills	2		128,000
Meat products—			
Hides			63,750
Lard			17,750
Tallow			4,637
Olive oil			625
Pickles			1,250
Cereals			16,000
Dredger			30,000

Manufactured Output.

	Quantity.
Brick (thousand)	1,250
Flour (barrels)	21,350
Hides (pounds)	637,500
Lard (pounds)	105,000
Tallow (barrels)	375
Olive oil (gallons)	250
Pickles (gallons)	1,600
Cereals (pounds)	533,350

MODOC COUNTY.

Modoc County lies in the extreme northeastern corner of California. The county is a succession of mountain ranges and valleys branching off from the Sierra Nevada Mountains, the principal spur of which is the Warner Range. It is principally drained by Pitt River, which flows into the Sacramento, near Redding, Shasta County. The lava-bed section occupies over one half the total area. The county has two large lakes, but barring the lakes and the large cattle ranges it is sparsely settled.

The valleys are the principal features, the leading ones being Surprise, Goose Lake, Hot Springs, Jess, Big, and Little Hot Springs.

Wheat, barley, fruit, vegetables, and hay are the leading staples. Thousands of acres are in alfalfa, and the stock and dairying industries are thriving. Every ranch has a fine orchard, and ranch houses and barns, costing $5,000 or $6,000 in total improvements, are not uncommon. Trees, both shade and ornamental, abound around every place.

The climate is that of the temperate zone, and the products are those of the great intermountain region which stretches from the Sierra to the western plains of Kansas. Snow falls in the valleys and much deeper in the mountains, forming the principal supply of moisture for the development of the country. Stock is usually fed for several months through the winter, although it is not always necessary to do so. The thermometer will sometimes run below zero for a few days in the winter, but not for very long, and 90 degrees is extreme heat for summer. Even in summer the evenings are cool and delightful.

The county is well watered. Surprise Valley has nearly twenty streams, which run both winter and summer. Goose Lake Valley is equally fortunate, while Pitt River supplies water for many farms and ranches. Many springs exist, especially in the mountains; and in Surprise Valley there are many artesian wells.

The timber of the county is pine and fir in the Warner Range, and sugar pine in the western part.

Horticulture has had but a small place in the industries, only sufficient fruit for home uses being raised. However, the gradual approach of the railroad running north from Reno, Nevada, will increase the productivity in this line immensely, as the county is well adapted to apples, pears, and berries. The wild plum is about the only native fruit. The cultivated fruits were brought in the earlier days from Eastern States by the immigrants who came across the plains. A great deal of orchard planting has been done within the last few years.

The last five years has seen a great deal of reservoir work undertaken throughout the county and its tributary valleys. The rains come in time to insure abundant harvests year after year.

The nearest railroad point to Alturas, the county seat, is Madeline, in Lassen County. Daily trains are run from Madeline to Reno, Nevada.

There are flouring mills located at Bidwell, Lake City, Cedarville, New Pine Creek, Alturas, and Adin. There are sawmills located at Bidwell, Cedarville, Eagleville, Willow Ranch, Davis Creek, Jess Valley, Alturas, Adin, and Willow Valley.

STATISTICS OF MODOC COUNTY, 1909-10.

General Statistics.

Area 4,100 square miles, or 2,624,000 acres.

Number of farms	784
Number of acres assessed	646,716
Value of country real estate	$3,738,900
Of improvements thereon	$476,895
Of city and town lots	$112,135
Of improvements thereon	$299,885
Of personal property	$1,270,657
Total value of all property	$6,049,252
Expended on roads, last fiscal year	$18,000
Expended for bridges, last fiscal year	$2,000
Number of miles of public roads	546
Road levy per $100, 1910	36c
Value of county buildings	$10,000
Irrigating ditches (miles)	400
Railroads, steam — miles, 28½; assessed value	$149,791
Electric power plants — 1; assessed value	$2,500
Electric power lines—miles, 6½; assessed value	$750
Number of acres irrigated	58,628

Cereal Products and Hay.

	Tons of 2,000 pounds. Acres.	Bushels.	Value.
Wheat	4,804	107,801	$109,957
Barley	4,356	133,008	111,726
Oats	2,293	52,844	36,990
Rye	260	2,739	3,287
Corn	100	2,000	1,000
	Acres.	**Tons.**	**Value.**
Alfalfa hay	5,719	18,101	$113,948
Grain hay	772	1,727	13,806
Grass hay	30,675	64,898	401,552
Total hay	37,166	84,726	$529,306

Live Stock Industry.

	Number.	Value.
Cattle—Beef	11,723	$446,239
Stock	41,822	836,440
Dairy Cows—Graded	1,126	56,300
Thoroughbred—		
Herefords	200	8,000
Holsteins	20	800
Jersey	40	2,000
Shorthorns	258	14,455
Calves	9,375	112,500
Swine	6,358	55,749
Horses—Thoroughbred	57	6,600
Standard-bred	80	14,300
Common	9,207	554,377
Colts	2,008	60,240
Jacks and jennies	94	35,705
Mules	899	67,595
Sheep	38,016	163,072
Lambs	28,083	84,249
Angora goats	1,883	7,532
Common goats	1,200	3,600
Full-blood horses and graded	46	70,000
	Pounds.	**Value.**
Wool	248,864	$36,297
Mohair	6,591	2,307
Common goat wool	1,800	540

Wines, Brandies, Etc.

	Gallons.	Value.
Beer (gallons)	27,000	$1,000
Cider	5,650	2,825
Vinegar	2,515	1,258

Dairy Industry.

	No.	Production.	Value.
Creameries	1	.....	$2,000
Butter (pounds)		108,096	27,024
Cheese (pounds)		15,720	1,730

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	24,756	2,024	26,780
Apricot	151	150	801
Cherry	686	430	1,116
Nectarine	50	10	60
Peach	1,330	632	1,962
Pear	1,062	506	1,568
Plum	1,670	770	2,440
Prune	312	75	387
Quince	8	.....	8
Total fruit	30,525	4,587	34,735
Walnut	175	10	185
Grapevines	100	.....	100
Berries, acres.	27	.....	27

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.
Apples	2,072,821
Apricots	49,650
Blackberries	2,235
Beets	123,525
Cabbage	138,700
Cauliflower	7,000
Corn	30,000
Currants	790
Cherries	61,015
Gooseberries	1,655
Grapes	300
Loganberries	2,665
Nectarines	6,000
Onions	4,000
Pears	121,550
Peaches	130,370
Plums	129,154
Irish potatoes	1,228,800
Sweet potatoes	100
Prunes	38,330
Quinces	600
Raspberries	34,435
Strawberries	12,000
Tomatoes	186,200

Dried—	Pounds.	Value.
Apples	31,250	$2,188
Apricots	500	35
Beans	61,715	3,086
Onions	110,270	3,308
Pears	750	53
Peas	2,000	20

Poultry and Eggs.

	Dozen.	Value.
Chickens	3,178	$12,712
Ducks	15	90
Geese	12	150
Turkeys	166	2,973
Eggs	1,906,800	476,700
Total value		$492,625

Forest Products.

	Amount.	Value.
Sawmills (number)	10	$75,000
Laths	300,000	975
Lumber (feet)	4,861,000	97,220
Shingles	735,000	2,572

Power used for mills and manufactories in county — Steam (number), 11; water (number), 4.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	1,000	$4,000
Beeswax	250	.....
Honey	30,000	3,000
Alfalfa seed	436,888	65,533
Grass seed	6,000	600
Sugar beets (tons)	815,000	16,000

MONO COUNTY.

Mono is a long, narrow county lying on the eastern slope of the Sierra, its greatest length bordering on the State of Nevada, which forms its northeastern boundary, its general direction being southeast and northwest.

The general contour is mountainous and very rough, all but 400 square miles, or less, being mountainous. The western portion lies among the Sierra Nevada Mountains, along their summit, the heights being clad in snow, and the slopes of the range being covered with forest trees.

Among the highest peaks are Mount Dana, 13,627 feet; Mount Lyell, 13,217 feet; and Castle Peak, 13,000 feet. The greater portion of the population is in the eastern part, in the valleys and the mining camps in the surrounding mountains. This portion, which has always been considered a strange, mysterious country, is of a desert-like, volcanic character abounding in salt pools, alkali, and volcanic table-lands, its character being significantly indicated by some of the local names such as Hot Springs, Geysers, Sulphur Springs, Black Lake, Soda Pond, Volcano, Obsidian Mountain, Deep Canyon, Volcanic Tableland, Red Crater, Obode Meadows, and Oasis.

Mono Lake, the "Dead Sea of America," is one of the attractions, and situated in the center of the county; it is about 12 miles long and 8 miles wide; its waters are a somewhat unusual compound, various chemical substances being found in solution in them. Several attempts have been made to utilize this water without success. This lake has all the appearances of having once been the scene of volcanic action. The country surrounding it, as Bodie, Aurora, Lundy, Tioga, and Benton, abounds in minerals. The lake has a number of small streams flowing into it, but is without a perceptible outlet.

Owens River in the south, which takes its rise in a high peak in the Sierra, and Kitten and Walker rivers in the north, are the principal streams. One passes through the southern part into Inyo County. The other, after rising in Mono County, continues its course into the State of Nevada. These two streams with their branches, together with the small streams that flow into Mono Lake, furnish the principal water supply for irrigation.

The retaining of the snow in the high mountains, at the sources of the streams used for irrigation, until later in the season, assures an abundance of pasturage on the mountain ranges, which are thronged with vast herds of cattle and bands of horses and sheep that are brought from the lower sections to graze during the summer.

That portion of the valley soil lying contiguous to the streams is very rich. A great deal of the sagebrush land, formerly considered barren, is found to be very productive when placed under cultivation. Thus the area of tillable land has been vastly increased within the last few years, and wherever water can be got on the land, even well up on the foothills, there are farms that are making comfortable homes for their owners.

country. Currants, gooseberries, blackberries, loganberries, and raspberries grow luxuriantly. Strawberries are in the market all the year round, and are shipped from Pajaro by car loads. Grapes grow to perfection everywhere in the county, except in the heavy bottom lands of the lower Salinas Valley.

As to potato raising, the Salinas Valley has no equal; here is the home of the famous Salinas Burbanks that are in such great demand all through the Northwest, and thousands of sacks are shipped to the Philippine Islands. As high as four hundred bushels to the acre have been raised near Salinas.

Dairying is a very prominent, if not a leading industry. Some of the finest dairies in the State are in Monterey County, and some of the best cheese and butter in the State are made here. They have the latest and best improved machinery, and have found their business very profitable.

Extensive work has been done in the last few years in bringing the valley under a thorough system of irrigation. Opposite Soledad, on the south side of Salinas River, considerable irrigation is done around Fort Romie on lands purchased by the Salvation Army, and sold on most favorable terms to worthy poor in need of homes. This is one of the most prosperous colonies in America. Around the Spreckels sugar factory, four miles from Salinas City, a great deal of land has been irrigated for raising beets. This is the largest beet-sugar factory in the world.

The main transcontinental line of the Southern Pacific Railroad enters this county through Pajaro Valley on the north, and runs southeast through its entire length, paralleling the Pajaro and Salinas rivers.

Pajaro is the great shipping point for apples, berries, all fruits, and dairy products of its section.

Hotel Del Monte, "the queen of American watering places," including the main structure and two annexes, together with the connecting wings, is simply immense, and everything connected with the establishment is on the same magnificent scale. The grandeur of the hotel is repeated in the grounds, which cover 140 acres, laid out in lawns, flower beds, parks, and groves, and the landscape gardening is a marvel of beauty.

A little farther on is Monterey, situated on the beach of Monterey Bay, lying back on her sloping hills and overlooking the placid waters of the bay—one of the grandest and most beautiful townsites nature ever formed.

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Soledad, named for Soledad Mission, is in another wheat belt, and is an important shipping point for grain and dairy products. It is the nearest point to Paraiso Springs, whose waters contain medicinal properties of a high order.

The narrow gauge railroad from Pajaro to Salinas parallels the main line on the west, taps Monterey Bay at Moss Landing—where there are extensive warehouses and lumber yards, and where the coast vessels stop regularly for grain and merchandise—then continues to Spreckels' sugar factory, and is used principally for hauling beets to the factory and lime rock from the quarries, though considerable grain is shipped by it from the region west of Salinas.

STATISTICS OF MONTEREY COUNTY, 1909-10.

General Statistics.

Area 3,600 square miles, or 2,304,000 acres.

Number of farms	5,200
Number of acres assessed	1,590,312
Value of country real estate	$13,503,900
Of improvements thereon	$2,038,030
Of city and town lots	$3,022,020
Of improvements thereon	$2,802,870
Of personal property	$3,377,014
Total value of all property	$24,743,834
Expended on roads, last fiscal year	$104,797
Expended for bridges, last fiscal year	$30,640
Number of miles of public roads	1,550
Road levy per $100, 1910	45c
Value of county buildings	$115,000
Irrigating ditches (cost)	$250,000
Railroads, steam — miles, 192; assessed value	$3,425,456
Railroads, electric — miles, 6; assessed value	$10,000
Electric power plants — 4; assessed value	$73,000
Electric power lines—miles, 35; assessed value	$5,000
Number of acres irrigated	24,400

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	220,650	36,800	257,450
Apricot	16,350	7,900	24,250
Cherry	450	1,500	1,950
Fig	.....	300	300
Lemon	50	50	100
Nectarine	200	.....	200
Olive	500	.....	500
Orange	500	100	600
Peach	4,750	1,000	5,750
Pear	6,250	3,500	9,750
Plum	2,000	1,000	3,000
Prune	1,850	.....	1,850
Quince	1,200	.....	1,200
Total fruit	255,050	51,850	306,900
Almond	3,000	.....	3,000
Chestnut	50	.....	50
Pecan	10	.....	10
Walnut	500	.....	500
Total nut	3,560	.....	3,560
Grapevines			54,000
Berries, acres			190

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	38,400,000	$384,000
Apricots	12,500	250
Asparagus	6,000	480
Blackberries	50,000	2,000
Beans	10,000	500
Beets	400,000,000	950,000
Cabbage	20,000	400
Celery	10,000	300
Cauliflower	10,000	300
Corn	500,000	5,000
Currants	1,000	30
Cherries	50,000	2,500
Gooseberries	2,000	100
Grapes	400,000	12,000
Loganberries	200,000	8,000
Onions	20,000	500
Pears	450,000	4,500
Peaches	500,000	7,500
Plums	100,000	1,000
Irish potatoes	16,000,000	1,440,000
Raspberries	50,000	2,000
Strawberries	1,000,000	50,000
Tomatoes	300,000	1,500
Totals	458,091,500	$2,872,860

Dried—	Pounds.	Value.
Almonds	20,000	$2,000
Apples	360,000	21,600
Apricots	220,000	17,600
Beans	480,000	19,200
Onions	500,000	10,000
Peaches	2,000	160
Plums	2,000	100
Prunes	8,000	400
Walnuts	2,000	220
Totals	1,594,000	$71,286

Canned—	Cases.	Value.
Apples	600	$1,400
Apricots	350	1,550
Pears	300	600
Peaches	800	1,600
Totals	2,050	$5,150

Wines, Brandies, Etc.

	Gallons.	Value.
Beer (barrels)	10,000	$65,000

Number of breweries, 2.

country. Currants, gooseberries, blackberries, loganberries, and raspberries grow luxuriantly. Strawberries are in the market all the year round, and are shipped from Pajaro by car loads. Grapes grow to perfection everywhere in the county, except in the heavy bottom lands of the lower Salinas Valley.

As to potato raising, the Salinas Valley has no equal; here is the home of the famous Salinas Burbanks that are in such great demand all through the Northwest, and thousands of sacks are shipped to the Philippine Islands. As high as four hundred bushels to the acre have been raised near Salinas.

Dairying is a very prominent, if not a leading industry. Some of the finest dairies in the State are in Monterey County, and some of the best cheese and butter in the State are made here. They have the latest and best improved machinery, and have found their business very profitable.

Extensive work has been done in the last few years in bringing the valley under a thorough system of irrigation. Opposite Soledad, on the south side of Salinas River, considerable irrigation is done around Fort Romie on lands purchased by the Salvation Army, and sold on most favorable terms to worthy poor in need of homes. This is one of the most prosperous colonies in America. Around the Spreckels sugar factory, four miles from Salinas City, a great deal of land has been irrigated for raising beets. This is the largest beet-sugar factory in the world.

The main transcontinental line of the Southern Pacific Railroad enters this county through Pajaro Valley on the north, and runs southeast through its entire length, paralleling the Pajaro and Salinas rivers.

Pajaro is the great shipping point for apples, berries, all fruits, and dairy products of its section.

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Irrigating ditches (cost)	$250,000
Railroads, steam — miles, 192; assessed value	$3,425,456
Railroads, electric — miles, 6; assessed value	$10,000
Electric power plants — 4; assessed value	$73,000
Electric power lines—miles, 35; assessed value	$5,000
Number of acres irrigated	24,400

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	220,650	36,800	257,450
Apricot	16,350	7,900	24,250
Cherry	450	1,500	1,950
Fig	.....	300	300
Lemon	50	50	100
Nectarine	200	.....	200
Olive	500	.....	500
Orange	500	100	600
Peach	4,750	1,000	5,750
Pear	6,250	3,500	9,750
Plum	2,000	1,000	3,000
Prune	1,850	.....	1,850
Quince	1,200	.....	1,200
Total fruit	255,050	51,850	306,900
Almond	3,000	.....	3,000
Chestnut	50	.....	50
Pecan	10	.....	10
Walnut	500	.....	500
Total nut	3,560	.....	3,560
Grapevines			54,000
Berries, acres			190

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	38,400,000	$384,000
Apricots	12,500	250
Asparagus	6,000	480
Blackberries	50,000	2,000
Beans	10,000	500
Beets	400,000,000	950,000
Cabbage	20,000	400
Celery	10,000	300
Cauliflower	10,000	300
Corn	500,000	5,000
Currants	1,000	30
Cherries	50,000	2,500
Gooseberries	2,000	100
Grapes	400,000	12,000
Loganberries	200,000	8,000
Onions	20,000	500
Pears	450,000	4,500
Peaches	500,000	7,500
Plums	100,000	1,000
Irish potatoes	16,000,000	1,440,000
Raspberries	50,000	2,000
Strawberries	1,000,000	50,000
Tomatoes	300,000	1,500
Totals	458,091,500	$2,872,860

Dried—	Pounds.	Value.
Almonds	20,000	$2,000
Apples	360,000	21,600
Apricots	220,000	17,600
Beans	480,000	19,200
Onions	500,000	10,000
Peaches	2,000	160
Plums	2,000	100
Prunes	8,000	400
Walnuts	2,000	220
Totals	1,594,000	$71,280

Canned—	Cases.	Value.
Apples	600	$1,400
Apricots	350	1,550
Pears	300	600
Peaches	800	1,600
Totals	2,050	$5,150

Wines, Brandies, Etc.

	Gallons.	Value.
Beer (barrels)	10,000	$65,000

Number of breweries, 2.

STATISTICS OF MONTEREY COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Bushels.	Value.
Wheat	24,640	266,666	$239,999
Barley	127,000	2,320,416	1,002,419
Oats	2,000	700	20,300
Total cereals	153,640	2,587,782	$1,262,718
	Acres.	Tons.	Value.
Alfalfa hay	2,000	8,000	$72,000
Grain hay	8,000	12,000	120,000
Total hay	10,000	20,000	$192,000

Fish Industry.

	Pounds.	Value.
Salmon	592,085	
Other kinds	1,275,000	
Total	1,867,085	

Dairy Industry.

	Production.	Value.
Butter (pounds)	760,000	$228,000
Cheese (pounds)	3,000,000	465,000
Condensed milk (cases)	162,000	486,000
Total		$1,179,000

Creameries, 45; condenseries, 1.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	9,400	$692,000
Stock	32,400	648,000
Dairy Cows—Graded	10,000	315,000
Calves	12,000	96,000
Swine	12,000	120,000
Horses—Thoroughbred	200	60,000
Standard-bred	3,600	360,000
Common	11,200	560,000
Colts	3,500	105,000
Jacks and jennies	30	16,500
Mules	600	66,000
Sheep	30,000	90,000
Lambs	10,000	20,000
Angora goats	1,800	7,200
Common goats	650	1,625
Total stock		$3,157,325
	Pounds.	Value.
Wool	132,000	$3,700
Mohair	18,500	

Poultry and Eggs.

	Dozen.	Value.
Chickens	18,000	$72,000
Ducks	250	1,125
Geese	150	1,200
Turkeys	400	4,800
Eggs	720,000	144,000
Total value		$223,125

Forest Products.

	Amount.	Value.
Fuel, wood (cords)	38,000	$209,000
Lumber (feet)	600,000	6,000
Pickets (pieces)	20,000	1,000
Posts (pieces)	6,000	660
Shakes (thousand)	50	250
Shingles (thousand)	500	1,500
Total value		$218,410

Power used for mills and manufactories in county—Steam (number), 40; electrical (number), 12.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	8,000	$31,500
Beeswax	5,000	1,500
Honey	367,500	28,537

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	1	20	$25,000
Cigars	10	60	
Confectionery	12	45	
Flouring mills	1	19	441,528
Lime	1	75	100,000
Planing mills	6	50	
Artificial stone	3	10	
Sugar, beet	1	700	1,875,000
Sardine canneries	2	297	157,500

Manufactured Output.

	Quantity.
Brick	2,000,000
Cigars	235,000
Flour (barrels)	54,091
Lime (barrels)	80,000
Hides (pounds)	369,000
Tallow (barrels)	500

NAPA COUNTY.

Napa County has shown a decided gain in population and wealth in the year 1909-1910. The total assessed valuation of property increased from $14,752,470 in 1909 to $15,095,295 in 1910. The principal resources of the county are the raising of grapes, the making of wine and of grape juice; raising of prunes, peaches, pears, plums, and other fruit, and growing of grain; quicksilver mining; the manufacture of cement at Napa Junction; the operation of tanneries, glove, shoe, cartridge, shirt, leather goods, and other manufacturing establishments.

Napa County has the great advantage of river transportation to the bay of San Francisco, passenger and freight steamers making daily trips between Napa and San Francisco. The board of supervisors have greatly improved the roads of the county in 1910, and Napa County leads the State in the number of stone bridges. The climate is mild, the thermometer rarely reaching 98° in the summer, and there are a number of extensive summer resorts, which are liberally patronized each year.

One great advantage of farming in Napa County is that no irrigation is required to produce any crops. The center of the Napa Valley is traversed by an electric railroad, as well as a steam road.

Napa County has almost 800 square miles of territory, and its southern boundary reaches down to within twenty-nine miles of San Francisco. The Napa River, a short tidal stream, which drains the great Napa Valley, is navigable to the heart of the city of Napa.

There are many large creeks, brooks, and many springs in the hills, both mineral and otherwise, all of which would furnish limitless water for irrigation, if Napa County needed it.

In addition to the water facilities, two steam roads and one electric line enter the city of Napa, thus making it one of the most desirable manufacturing towns in the State of California.

STATISTICS OF NAPA COUNTY, 1909-10.

General Statistics.

Area 800 square miles, or 512,000 acres.	
Number of farms	7,500
Number of acres assessed	410,000
Value of country real estate	$5,295,585
Of improvements thereon	$2,686,785
Of city and town lots	$1,856,025
Of improvements thereon	$2,666,735
Of personal property	$15,095,295
Total value of all property	$27,600,425
Expended on roads, last fiscal year	$43,900
Expended for bridges, last fiscal year	$25,000
Number of miles of public roads	150
Road levy per $100, 1910	36c
Value of county buildings	$130,000
Railroads, steam — miles, 56.07; assessed value	$1,385,833
Railroads, electric—assessed value	$207,196
Electric power plants—assessed value	$100,000
Electric power lines—assessed value	$70,000
Number of acres irrigated—Alfalfa	50

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	45,001	135,000	$118,250
Barley	3,000	105,000	42,000
Oats	5,500	275,000	110,000
Corn	2,500	80,000	72,000
Total cereals	15,500	595,000	$342,250

	Acres.	Tons.	Value.
Alfalfa hay	1,000	4,000	$40,000
Grain hay	5,000	10,000	80,000
Grass hay	2,000	2,000	12,000
Total hay	8,000	16,000	$132,000

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	4,000,000	$400,000
Champagne	5,000	18,000
Beer (barrels)	460,000	115,000
Brandy	9,750	39,000
Cider	500	
Vinegar	5,000	750
Grape juice	20,000	7,000

Number of wineries, 39; number of distilleries, 4; number of breweries, 3.

STATISTICS OF NAPA COUNTY, 1909-10—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	45,000	10,190	55,190
Apricot	17,000	2,370	20,370
Cherry	32,000	2,900	34,700
Fig	1,500	690	2,190
Lemon	1,030	480	1,510
Nectarine	390	110	500
Olive	43,460	690	44,150
Orange	2,100	2,130	4,230
Peach	107,880	6,400	114,280
Pear	69,120	920	70,040
Plum	120,320	35,090	155,410
Prune	91,180	8,465	99,645
Quince	970	730	1,700
Total fruit	531,950	71,165	603,115
Almond	47,450	3,160	50,610
Walnut	9,400	2,240	11,640
Total nut	56,850	5,400	62,250
Grapevines	11,270	4,840	16,110
Hops (acres)			100
Potatoes (acres)			450

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	1,950,000	$12,590
Apricots	1,000,000	9,800
Blackberries	22,000	770
Cabbage	10,000	250
Cauliflower	5,000	125
Cherries	410,200	20,500
Grapes	60,000,000	330,000
Loganberries	10,000	500
Onions	12,000	250
Pears	2,500,000	25,000
Peaches	3,100,000	31,000
Plums	640,000	6,400
Irish potatoes	410,000	8,200
Strawberries	31,000	2,300
Totals	90,100,200	$447,685

Dried—	Pounds.	Value.
Apples	20,000	$1,000
Apricots	160,000	8,000
Pears	340,000	17,500
Peaches	510,000	20,400
Prunes	3,600,000	96,000
Totals	4,630,000	$142,900

Canned—	Cases.	Value.
Pears	18,000	$86,400
Peaches	13,000	62,400
Plums	16,000	.....
Totals	47,000	$220,800

Dairy Industry.

	No.	Production.	Value.
Creameries	7	211,500	$73,778
Butter (pounds)		210,000	73,500
Cheese (pounds)		1,500	278

Live Stock Industry.

	Number.	Value.
Cattle—Beef	272	$6,800
Stock	4,040	80,800
Dairy Cows—Graded	9,255	240,000
Thoroughbred—Jersey	135	6,750
Calves	2,060	10,300
Swine	2,710	13,550
Horses—Thoroughbred	5	4,000
Standard-bred	170	42,500
Common	5,890	294,500
Colts	1,525	30,500
Jacks and jennies	10	100
Mules	340	17,000
Sheep	3,650	10,950
Lambs	500	1,000
Common goats	150	300
Total stock	30,712	$759,050
Wool (pounds)		3,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	2,600	$13,000
Ducks	50	300
Geese	10	60
Turkeys	200	4,800
Eggs	15,000	4,500
Total value		$22,660

Forest Products.

	Amount.	Value.
Fuel, wood (cords)	1,500	$8,250

Power used for mills and manufactories in county—Steam (number), 24; electrical (number), 18.

Miscellaneous Products.

Honey (pounds)	1,500

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	1	2	$2,000
Paper boxes	1	10	12,000
Carriages and wagons	3	15	6,000
Cement	..	.....	1,400,000
Cigars	..	.....	7,425
Clothing	..	.....	140,000
Crackers	1	7	20,000
Foundries and iron works	3	11	15,000
Leather goods	1	8	10,400
Malt	1	2	5,000
Olive oil	2	4	5,000
Planing mills	5	20	100,000
Granite and marble	3	11	25,000
Tanneries	2	94	700,000
Shoes	1	200	250,000
Gloves	2	273	500,000

Manufactured Output.

	Quantity.
Cement (tons)	99,500
Cigars (thousand)	165
Crackers (pounds)	20,000

NEVADA COUNTY.

Nevada County is situated in that part of the State of California generally known as the northern portion, although its county seat, Nevada City, is but 60 miles from Sacramento. It has an area of about one thousand square miles, and is bounded on the north by Sierra County, on the east by the State line between California and Nevada, on the south by Placer County, and on the west by Yuba County. From the Yuba County line, Nevada County is hemmed in by the Yuba and Bear rivers until their sources are reached. The South Yuba River heads in the high Sierra and runs across the county almost its entire length from east to west.

The climate is more varied than almost any other part of the State. On the rolling foothills of the western portion, where snow and frost are seldom seen, the elevation is slightly above the sea level, while along the eastern boundaries rise the snow-capped peaks of the Sierra Nevadas to an elevation of nearly 8,000 feet. The mean temperature, using Nevada City as the center, is about 68° Fahrenheit.

The principal towns in the county are Nevada City, with a population of 3,500; Grass Valley, 7,000, and Truckee, 2,000.

The Southern Pacific Railroad skirts the southern boundary line of the county for over 30 miles from west to east. From Colfax, on the line of the Southern Pacific Railroad, the Nevada County Narrow Gauge Railroad runs through Grass Valley, the metropolis of the county, to Nevada City, the county seat, a distance of 22 miles. Grass Valley and Nevada City, being only four miles apart, are also connected by an electric railroad. There is at present under course of construction what is known as the California Midland Railroad, which will connect Nevada City, Grass Valley, Auburn, of Placer County, and Marysville, of Yuba County.

Nevada County's splendid water system is also one of the many advantages so essential to the mine operator, farmer, and fruit grower. At the present time there is a network of ditches, canals, and waterways aggregating 1,000 miles in length, giving the finest water power and supply system in the State. The Pacific Gas and Electric Company have three large plants in and adjacent to our county supplying us with an unlimited amount of electricity for lighting and power purposes.

The principal industries are farming, stock raising, dairying, fruit growing, and mining.

In the Chicago Park section, which is on the line of the Nevada County Narrow Gauge Railroad, between Colfax and Grass Valley, the soil is particularly adapted to the culture of Bartlett pears, Hungarian prunes, and grapes, all of which are grown without irrigation, and large shipments are made each year, bringing top prices in all Eastern markets.

In the southwestern portion of the county, where there is an abundance of water, the farmers are turning their attention quite extensively to dairying, which is proving to be a very profitable business. The Penn Valley Creamery, being centrally located in that section, buys all the cream from the dairyman, and is on a dividend-paying basis.

In the extreme eastern end of our county, situated on the Truckee

River, the Floriston Pulp and Paper Company are operating one of the largest pulp and paper plants on the coast, employing in and about the plant about 180 men and turning out a yearly product to the value of $500,000.

In the production of gold, Nevada County has for the past forty years been unsurpassed. Although it has been a continual producer since the year 1849, during which time it is estimated over $250,000,000 have been taken out, still we believe that the industry is but in its infancy. Some of the mines are working at a depth of 4,000 feet, and have proven conclusively that in every instance where depth has been attained the ore bodies and the values are equally distributed.

Nevada County is a field for investors and homeseekers. It has unlimited undeveloped mineral wealth, superb climate, soil that will produce immensely, a school system of which we are justly proud (three high schools accredited to the university, two of which also carry commercial courses), clean newspapers, churches, banks, and towns and cities whose social standing are of the best. We have also in Grass Valley Armstrong's Business College, with a state-wide reputation for efficiency.

As to the development of its natural resources, it is practically in its infancy, and an investigation of capital and homeseeker alike is earnestly solicited.

STATISTICS OF NEVADA COUNTY, 1909-10.

General Statistics.

Area 1,016 square miles, or 650,240 acres.	
Number of farms	420
Number of acres assessed	490,092
Value of country real estate	$2,583,785
Of improvements thereon	$1,535,480
Of city and town lots	$442,950
Of improvements thereon	$1,278,400
Of personal property	$1,127,135
Total value of all property	$6,967,750
Expended on roads, last fiscal year	$30,996
Expended for bridges, last fiscal year	$4,576
Number of miles of public roads	650
Road levy per $100, 1910	50c
Value of county buildings	$100,000
Irrigating ditches—miles, 1,000; cost	$4,223,760
Railroads, steam — miles, 53.41; assessed value	$1,095,717
Railroads, electric — miles, 5.7; assessed value	$47,200
Electric power plants — 4; assessed value	$190,000
Electric power lines—miles, 124; assessed value	$53,250
Number of acres irrigated	560

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	12,270	1,050	13,320
Apricot	170	25	195
Cherry	285	80	365
Fig	340	10	350
Lemon	15	.....	15
Nectarine	35	.....	35
Olive	55	45	100
Orange	150	.....	150
Peach	12,760	950	13,710
Pear	36,270	7,400	43,670
Plum	2,300	900	3,200
Prune	5,800	235	6,035
Quince	150	.....	150
Total fruit	70,600	10,695	81,295
Almond	150	105	255
Chestnut	20	40	60
Walnut	400	680	1,080
Total nut	570	825	1,395
Grapevines	760	30	790
Berries (acres)	40	.....	40

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	250,000	$3,750
Apricots	5,000	200
Blackberries	35,000	1,750
Beans	14,000	700
Beets	15,000	300
Cabbage	120,000	1,800
Celery	6,000	300
Corn	25,000	375
Currants	750	60
Cherries	40,000	2,000
Figs	16,000	320
Grapes	100,000	2,000
Loganberries	1,800	144
Oranges (25-lb. boxes)	75	150
Pears	539,000	16,170
Peaches	150,000	3,000
Peas	8,000	320
Plums	32,250	970
Irish potatoes	300,000	4,500
Prunes	100,000	2,000
Raspberries	5,000	400
Strawberries	4,000	320
Tomatoes	25,000	500
Total		$42,029

Dried—	Pounds.	Value.
Prunes	16,000	$800
Walnuts	4,000	600
Total		$1,400

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Alfalfa hay	200	800	$12,000
Grain hay	6,185	6,185	133,700
Grass hay	200	200	2,000
Total hay	6,585	7,185	$147,700

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	5,000	$3,750
Beer (barrels)	4,250	41,437
Vinegar	3,500	875

Number of wineries, 1 (small); number of breweries, 5 (small).

STATISTICS OF NEVADA COUNTY, 1909-10—Continued.

Dairy Industry.

	Production.	Value.
Butter (pounds)	177,014	$58,414
Creameries, 1.		

Live Stock Industry.

	Number.	Value.
Cattle—Beef	600	$24,000
Stock	2,600	52,000
Dairy Cows—Graded	1,875	75,000
Calves	1,468	7,240
Swine	497	3,415
Horses—Standard-bred	221	33,650
Common	1,496	149,600
Colts	116	5,800
Mules	42	4,200
Sheep	5,000	15,000
Lambs	1,300	3,250
Common goats	370	740
Total stock		$377,395
Wool (pounds)	25,200	5,040

Poultry and Eggs.

	Dozen.	Value.
Chickens	1,500	$6,750
Turkeys	40	1,200
Eggs	90,000	27,000
Total value		$34,950

Miscellaneous Products.

	Pounds.	Value.
Natural ice (tons)	150,000	$375,000
Granite (cubic feet)	1,250	2,800
Macadam (tons)	1,304	571

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	19,000	.....
Cedar, pine, redwood (acres)	.....	$190,000
Sawmills (number)	5	.....
Fuel, wood (cords)	25,000	100,000
Lumber (feet)	20,000,000	300,000
Paper pulp (tons)	8,750	240,625
Pickets (pieces)	40,000	800
Posts (pieces)	4,000	1,000
Shakes (thousand)	400	4,000
Total value		$836,425

Power used for mills and manufactories in county—Steam (number), 20; electrical and water (number), 35.

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	2	100	$16,000
Cigars	7	14	45,000
Confectionery	4	4	6,000
Foundries and iron works	3	30	150,000
Meat products—			
Hides	..	.....	12,000
Lard	..	.....	6,000
Paper	1	180	500,000

Manufactured Output.

	Quantity.
Cigars (thousand)	1,000
Paper (pounds)	16,000,000

ORANGE COUNTY.

Orange County is bounded on the north by Los Angeles County, on the east by San Bernardino and Riverside counties, on the south by San Diego County, and on the west by the Pacific Ocean. The Santa Ana River enters the county on the northeast boundary and empties into the Newport Bay, furnishing irrigating water to the Anaheim Union Water Company and Santa Ana Valley Irrigating Company. The Santiago Creek furnishes water to and along the foothills east of Orange.

The Santa Fe, Pacific Electric, and Southern Pacific enter the county on the northwest boundary and run nearly parallel, meeting at Santa Ana, the Santa Fe continuing on to San Diego, and the Southern Pacific terminating at Newport Beach, and the Pacific Electric running to Huntington Beach. The Pacific Electric also enters the county on the northwest, running to Yorba Linda. The Santa Fe built a cut-off from Richfield to Fullerton.

San Juan by the Sea, Arch Beach, and Laguna Beach are open coast resorts. Corona del Mar, East Newport, Balboa, Newport Beach, and Port Orange are situated on Newport Bay, which is the best shipping point of the county. Huntington Beach, Sunset Beach, and Bay City, and Balboa are situated on the northwest and are connected with Newport Beach by the Pacific Electric. The Pacific States Tobacco Company have 40,000 acres of Turkish tobacco, this being the first Turkish tobacco grown in the county.

STATISTICS OF ORANGE COUNTY, 1909-10.

General Statistics.

Area 780 square miles, or 489,200 acres.

Number of farms	4,783
Number of acres assessed	443,247
Value of country real estate	$13,222,775
Of improvements thereon	$2,798,355
Of city and town lots	$4,552,855
Of improvements thereon	$2,545,360
Of personal property	$4,490,730
Total value of all property	$27,783,810
Expended on roads and bridges, last fiscal year	$87,760
Road levy per $100, 1910	40c
Value of county buildings	$124,490
Irrigating ditches (miles)	300
Railroads, steam — miles, 132	.....
Railroads, electric — miles, 47; assessed value	$782,510
Electric power plants — 1; assessed value	$171,180
Electric power lines — assessed value	$48,140
Number of acres irrigated	31,547

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	12,795	1,540	13,335
Apricot	167,240	23,370	191,610
Fig	2,500	.....	2,500
Lemon	92,655	.....	92,655
Olive	21,365	.....	21,365
Orange	739,785	213,115	952,900
Peach	38,350	10,320	48,670
Pear	5,425	375	5,800
Plum	1,270	.....	1,270
Prune	17,320	.....	17,320
Total fruit			1,347,425
Walnut	152,220	95,250	.....
Grapevines			590
Berries (acres)			310

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	511,800	$5,118
Asparagus	38,000	1,900
Blackberries (crates)	5,670	6,237
Cabbage	5,900,000	54,100
Celery (cars)	1,212	275,720
Cauliflower (crates)	11,970	275,725
Corn	80,000	800
Grapes (tons)	490	3,600
Grape fruit	3,840	3,840
Lemons (boxes)	43,392	151,872
Oranges (boxes)	840,960	1,261,440
Olives (tons)	820	26,000
Peaches	575,250	5,752
Pears	108,500	1,085
Peas	160,000	4,000
Plums	38,100	762
Irish potatoes (sacks)	250,000	250,000
Sweet potatoes	30,000	3,750
Prunes	519,600	25,980
Raspberries (crates)	8,000	8,000
Strawberries (crates)	19,000	20,900
Tomatoes	2,568,000	25,680
Total		$2,176,271

Dried—	Pounds.	Value.
Apricots	1,700,000	$170,000
Beans (sacks)	210,000	672,000
Peanuts	60,000	2,400
Walnuts	9,107,658	910,765

Canned—	Cases.	Value.
Peaches	7,332	14,664
Tomatoes	20,000	30,000
Assorted	12,696	88,000

Fish Industry.

	Pounds.	Value.
All kinds	787,800	$26,563

STATISTICS OF ORANGE COUNTY, 1909-10—Continued.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	60,000	$12,000
Sweet wines	30,000	9,000
Beer (barrels)	10,050	90,450
Brandy	6,000	6,000

Number of wineries, 4; number of distilleries, 3; number of breweries, 1.

Dairy Industry.

	Production.	Value.
Butter (pounds)	142,152	$56,850
Cheese (pounds)	273,750	82,125
Total value		$138,985

Creameries, 1; skimming stations, 5.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	347	$13,880
Stock	8,500	25,500
Dairy Cows—Graded and thoroughbred	5,141	257,050
Shorthorn heifers	189	3,780
Calves	1,565	9,390
Swine	1,037	12,444
Horses—Thoroughbred	39	7,800
Common	7,649	780,000
Colts	1,257	63,850
Jacks and jennies	2	1,000
Mules	2,035	407,000
Sheep	18,030	63,105
Lambs	7,330	18,325
Total stock		$1,663,124
Wool (pounds)	216,360	52,963

Poultry and Eggs.

	Dozen.	Value.
Chickens	16,500	$115,500
Ducks	2,200	17,600
Geese	150	3,520
Turkeys	225	4,500
Eggs	236,750	71,025
Total value		$212,145

Forest Products.

Eucalyptus (acres) $20,000

Power used for mills and manufactories in county—Steam (number), 2; electrical (number), 1; water (number), 1.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	8,500	$25,000
Beeswax	9,500	2,850
Honey	550,000	33,000
Sugar beets (tons)	110,000	605,000
Chili peppers, green (tons)	400	8,000
Chili peppers, dry	100	20,000
Apricot pits (tons)	105	12,600
Bean straw (tons)	550	2,200
Crude oil (lubricating)	4,186,914	2,512,148

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	1	.....	.....
Brick	1	20	$110,000
Cigars	4	14	16,800
Flouring mills	1	15	175,255
Ice plants	2	15	19,534
Machinery	1	10	125,000
Olive oil	..	.....	750
Pickled olives	1	.....	400
Planing mills	5	80	160,000
Artificial stone	1	4	8,000
Sugar, beet	2	320	1,850,000
Tiling	2	12	78,361

Manufactured Output.

	Quantity.
Brick, common (thousand)	200,000
Cigars (thousand)	480
Olive oil (gallons)	300
Pickled olives (gallons)	800

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	5,000	2,500	$87,500
Barley	34,120	27,296	545,920
Oats	4,375	1,750	52,500
Corn	2,590	1,345	40,350
Total cereals	46,185	32,891	$726,270
Alfalfa hay	4,000	20,000	200,000
Grain hay	25,350	16,742	200,904
Total hay	29,350	36,742	$400,904

PLACER COUNTY.

Placer County lies between latitude 38° 70′ and 39° 30′. Its direction is northeast and southwest. It is about 100 miles long and of varying widths, from 10 to 30 miles, the course and distance being defined by the course of the rivers which mark its boundaries. It extends from about 8 miles from the Sacramento River to the summit of the Sierra Nevada Mountains. Just above Auburn, between the Bear and American rivers, the county is very narrow, being about 8 miles across. Above Auburn it widens out into the two divides lying between the Bear River and the Middle Fork of the American River. These are known as the Dutch Flat or Railroad Divide, and the Forest Hill Divide. The southwestern portion is more regular in shape than the part just described. This section contains the foothill and level agricultural lands. Its shape is nearly a parallelogram, the southwest two thirds being on the plains proper, and the southeast one third being the foothill and fruit district.

Of the area, 810 square miles are mountainous, 450 foothills, and the remainder valleys. The entire extent faces toward the west, extending from an altitude of some 40 feet on the plains in the western portion to over 7,000 feet at its eastern boundary line, embracing nearly every variety of climate known in the State. At the eastern boundary, separating it from the State of Nevada, is Lake Tahoe, one of the most picturesque lakes in America. The topography of Placer County is as irregular as is its shape. Imagine the whole Atlantic coast from Labrador to Tallahassee incorporated into one county, and one will have a fair idea of what may be found in Placer, exaggerated as to size, but not as to the great variety of climate, elevation, soils, and resources. As to the latter, the whole Atlantic seaboard can hardly equal the endless variety to be found within the borders of this county, which rivals Florida in the quality of its oranges, excels New Jersey in peaches, equals the New England States in its granite quarries, and compares favorably with Maine in the quality of its lumber.

From an elevation of about 2,500 feet up to the summit of the mountains snow falls in the winter, light at the lower edge of the line, and increasing in depth as it ascends the Sierra. Here is a strip of territory from the snow line up to an elevation of 3,000 feet, particularly well adapted to the apple, the pear, and a great variety of vegetables.

The soil of the western or valley portion is of the same general alluvial composition as all the soil in the Sacramento Valley, and is well adapted to the growth of grain. Over 30,000 acres are annually devoted to wheat, barley, oats, and hay. The low foothills back of Lincoln are excellent for the grape.

The soil of the valley lands is mostly a red loam, mixed with considerable clay in spots; that of the foothills is a gravelly red loam, in places light and sandy, and is excellent for the production of fruits. Further up the soil changes to a red character, with a slate bedrock. This, too, is very fertile. The agricultural region includes the valley and foothill lands all the way from the western boundary to an elevation above Colfax. The foothills everywhere possess a soil which only

needs cultivation. The granite soils around Newcastle are composed largely of clay, sand, soda, potash, lime, phosphorus, iron, and manganese. The constant decomposition that is going on appears to be of nearly endless duration, and of such a nature as to render the soil almost inexhaustible. Artificial fertilization has not yet been found necessary.

For an irrigation water supply, Placer has three sources—the Yuba, Bear, and American rivers. Including its branches, the Bear River irrigation ditch is 200 miles in length. This system has been increased in its capacity, and brings water from the Yuba River, so that an abundance is assured. There are several other canals, originally built for mining, but now used for irrigation.

Placer County holds a foremost position among the fruit producers, and it is the most easterly of the counties in California. With the Central Pacific Railroad running the entire length of her territory, she is one day nearer the Eastern market than any other part of the State, a very large item in the shipping of green fruit. In her thermal belt fruit ripens earlier than in most other places in the State, another large advantage. Pears, plums, prunes, apples, apricots, cherries, persimmons, pomegranates, quinces, and figs all do well. Peaches have been grown for the past twenty-five years, and failure of a crop is unknown. Fine oranges are produced, and Placer holds a position beside Butte in the northern citrus belt. In the production of small fruits, berries, and table grapes, Placer holds a foremost place.

The largest cherry trees in the world are at the ranch of Robert Hector, from one of which has been picked as high as 3,000 pounds in one season. At the Pan-American Exposition Placer won gold medals for peaches, oranges, and grapes. An exhibit of fifty oranges averaged twenty-four ounces in weight.

A lemon that was on exhibition at the Sacramento Chamber of Commerce measured 22 inches in circumference the small way, and weighed three and a half pounds.

Olive growing is a profitable industry. The principal orchards are provided with manufacturing plants and are producing a very fine quality of oil.

Dairying and stock and poultry raising are extensive industries. Butter making is carried on in the summer, the mountain ranges providing plenty of natural feed; the butter is of a very fine quality.

Considerable quantities of vegetables are raised, not only for local consumption, but also for shipment abroad.

Much sugar and yellow pine, fir, spruce, and cedar are found in the mountains, and the lumber output from that section has been very large for many years. Oak and scrub pine abound all over the foothills, and fuel is plentiful.

Placer County ranks well up among the mining counties. Her average yearly contribution to the world's wealth is something above the million mark. The total production since the discovery of gold at Auburn, May 16, 1848, is estimated at much over $75,000,000. The mining methods include drift, river, placer, and quartz. Placer's drift mines are among the largest in the world.

The granite quarries rank with the best in the United States. Nearly all the street curbing in San Francisco is from the Placer quarries,

while the State Capitol is an example of the value and beauty of foothill granite.

Potter's clay is found in abundance at Lincoln, from which is manufactured sewer pipe, tiling, pressed brick, architectural terra cotta, and glazed brick for interior decoration.

Placer County is a natural sanatorium. As a resort for patients suffering from pulmonary diseases, leading physicians say it has no equal on the Pacific coast. It is here patients find relief, and some of them are cured. The altitude is just right for people suffering from asthma or bronchial diseases.

STATISTICS OF PLACER COUNTY, 1909-10.

General Statistics.

Area, 1,390 square miles.

Number of farms	1,027
Number of acres assessed	667,100
Value of country real estate	$4,538,265
Of improvements thereon	$1,047,270
Of city and town lots	$955,660
Of improvements thereon	$1,409,315
Of personal property	$1,641,585
Total value of all property	$9,777,045
Expended on roads, last fiscal year	$47,900
Expended for bridges, last fiscal year	$11,375
Number of miles of public roads	915
Road levy per $100, 1910	40c
Value of county buildings	$260,000
Irrigating ditches — miles, 194; cost	$215,300
Railroads, steam—miles, 140.47; assessed value	$3,419,543
Railroads, electric — miles, 1.3; assessed value	$6,158
Electric power plants — 3; assessed value	$39,400
Electric power lines—miles, 90; assessed value	$45,000
Number of acres irrigated	160,750

Cereal Products and Hay.

	Acres.	Bushels.	Value.
Wheat	15,940	175,340	$141,740
Barley	9,340	149,440	115,000
Oats	7,100	71,900	93,200
Total cereals	32,380	396,680	$349,940

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,690	$47,750
Stock	1,749	26,235
Dairy Cows—Graded	2,319	57,975
Thoroughbred—Jersey	109	4,360
Calves	640	3,790
Swine	765	2,460
Horses—Thoroughbred	8	3,750
Standard-bred	11	2,875
Common	2,095	89,000
Colts	210	5,950
Jacks and jennies	47	1,150
Mules	391	19,750
Sheep	19,600	58,800
Lambs	1,470	1,470
Common goats	1,260	1,260
Total stock	32,364	$326,575
Wool (pounds)	76,000	9,700

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	137,400	$39,400
Sweet wines	119,700	28,300
Brandy	8,450	7,670
Vinegar	5,600	560

Number of wineries, 2.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.
Apple	19,480	3,175
Apricot	7,485	950
Cherry	23,480	2,690
Fig	5,980	395
Lemon	675	.....
Nectarine	6,940	785
Olive	29,470	1,180
Orange	37,260	6,490
Peach	994,250	190,260
Pear	104,600	19,120
Plum	239,300	39,470
Prune	20,465	2,980
Quince	1,980	350
Total fruit	1,491,365	267,845
Almond	5,940	975
Walnut	370	.....
Total nut	6,310	975
Grapevines (acres)		4,948

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	287,100	$4,890
Apricots	317,900	13,740
Blackberries	119,700	5,750
Currants	4,960	470
Cherries	502,000	47,300
Figs	10,950	980
Grapes	1,859,300	49,200
Lemons (boxes)	340	390
Loganberries	69,200	4,900
Nectarines	13,970	465
Oranges (boxes)	57,350	59,275
Pears	4,290,600	41,900
Peaches	15,701,600	304,175
Persimmons	16,900	1,140
Plums	9,940,200	247,560
Quinces	18,400	280
Raspberries	42,300	1,740
Strawberries	178,900	7,985
Tomatoes	173,900	3,160
Totals	33,605,570	$795,300

Dried—	Pounds.	Value.
Almonds	6,740	$275
Apples	3,700	220
Figs	10,300	890
Pears	18,400	750
Peaches	81,400	2,400
Prunes	19,760	790
Walnuts	4,300	215
Totals	144,600	$5,540

Dairy Industry.

	No.	Production.	Value.
Creameries	4	79,700	$18,150
Butter (pounds)		7,500	2,000

STATISTICS OF PLACER COUNTY, 1909-10—Continued.

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	100,000	$1,000,000
Sawmills (number)	3	38,000
Total value		$1,038,000

Power used for mills and manufactories in county—Steam (number), 5; electrical (number), 4; water (number), 3.

Miscellaneous Products.

	Pounds.	Value.
Flowers and plants (acres)	30	$30,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Cigars	3	12	$21,300
Confectionery	2	6	4,700
Olive oil	2	10	9,800
Pickled olives	..	.....	1,000
Sewer pipe	..	.....	320,000
Planing mills	2	10	33,000
Potteries	1	400	394,500
Granite (950 cars)	..	200	.....

Manufactured Output.

	Quantity.
Brick (thousand)	2,000
Olive oil (gallons)	4,900

RIVERSIDE COUNTY.

Riverside County was formed in 1893 from the southwestern part of San Bernardino and the northern part of San Diego counties. It is about 200 miles long by 40 miles wide, and embraces most varied geographical and topographical features, climate, scenery, soil, agricultural, horticultural, and mineral resources. It contains within its borders one of the highest mountains of southern California and the greatest depression below sea level.

The principal rivers of the county are the Colorado, which forms its eastern boundary; the Santa Ana, having its head in the San Bernardino range of mountains, flowing through the northwestern part of the county, furnishing irrigation for a large area of land; the San Jacinto, having its source in the San Jacinto range, flowing through the San Jacinto, Hemet, and Perris valleys, and forming Lake Elsinore.

While the progress of the county has been practically confined to its northwest corner, which embraces the largest orange growing district in the world, and is supplied by one of the best and most complete irrigating systems in the State, the entire western portion is being brought under cultivation from the rapid development of artesian wells.

Beaumont and Banning, two growing towns and prosperous communities of the "Pass country," are well known for their deciduous fruits, hay and grain crops, and stock interests. Further east the Coachella Valley is producing vegetables, melons, and cantaloupes extensively, which, on account of early maturity, reach the markets in advance of other localities. The valley has four trading points—Indio, Coachella, Thermal, and Mecca, all growing communities. The Government has two experimental stations in this valley for the propagation of the date palm, and already has trees in bearing. The excellence of the fruit proves this locality to be well adapted to this industry. Quite an acreage of eucalyptus is being planted, and spineless cactus is receiving some attention.

The Palo Verde country, in the extreme eastern portion and bounded by the Colorado River, is receiving a great deal of attention and promises to develop into a very prosperous agricultural community.

The central and greater part of the eastern portion of the county is desert, but known to be heavily mineralized with almost every known mineral—gold, silver, copper, iron, lead, tin, borax, soda, and nitrates. The high cost of freight, fuel, and scarcity of water, making prospecting dangerous, all combine to retard mining developments, but as transportation facilities increase mining will be one of the leading features of the county.

The San Jacinto and Hemet valleys, situated about 45 miles southeast of Riverside City, at the base of the San Jacinto Mountains, are excellently adapted to diversified farming, and the foothills to stock grazing. The San Jacinto Valley is watered by numerous flowing wells and the Hemet Valley by the great Hemet dam, the largest piece of solid masonry in the West, forming a reservoir filled with pure mountain water from the snows of the San Jacinto Mountains, the supply of which is more than sufficient for all purposes and irrigation. The town of Hemet is one of the most prosperous of the county. Three miles distant is San Jacinto, one of the oldest towns in southern California, and

has maintained a steady growth from its farming, dairying, and lumber interests, the mountains adjacent being heavily timbered. A branch of the great Cawston Ostrich Farm is located here, and the town has a reputation as a health resort on account of its lithia and hot sulphur springs. The potato is one of the staples for which Hemet is famous. Alfalfa and broomcorn are grown extensively. All kinds of deciduous fruits do well, and quite an acreage of citrus fruit is in bearing.

The town of Elsinore, situated about 20 miles southwest on the shore of Lake Elsinore, is made prosperous from its varied products. Dressed stone, clay and clay products, honey, dried fruits, olives, olive oil and all kinds of farm products. It is famed as a health resort, the hot sulphur springs located on the north side of the lake being remarkable for healing qualities in some forms of disease.

Perris is a thriving village situated about halfway between the city of Riverside and Hemet. The Perris Valley, including Alessandro and Moreno, is making wonderful progress. The soil is very fertile and the discovery and development of an underground lake with practically unlimited water supply has opened up new industries, and hundreds of acres of alfalfa are being sown. The eucalyptus industry is receiving its share of attention and quite an extensive acreage is being planted in these sections. Transportation is furnished by the Santa Fe Railway.

Corona, the second city in size in the county, is known for its lemon groves, which are among the best in the world, as well as its fine orange groves and its many manufacturing enterprises. Clay products comprise the manufacture fourth in importance in the United States and of importance in the county the clay industry is first, the deposits being marvelous and of almost inexhaustible supply.

Riverside, the metropolis and county seat, is noted as being one of the most beautiful cities in California; has more miles of oiled macadam streets than any community of like size, and takes great pride in keeping them clean. It claims to be the greatest orange growing center in the world, the annual production being over six thousand car loads. It is a city of churches, all denominations being represented, together with its magnificent county buildings, public library, commodious public school buildings of architectural beauty; a bountiful water supply, electric railway system, electric and gas plants, cement works employing upward of three hundred men, station for three continental railway systems, and no saloons, are features which go to make up a happy and contented citizenship.

Arlington, a suburb of Riverside and contained in its municipality, is a progressive village and the seat of Sherman Institute, a Government school for Indians.

The public school system of the county is very efficient and ample, there being sixty-five school districts, in eight of which are high schools.

STATISTICS OF RIVERSIDE COUNTY, 1909-10.

General Statistics.	
Area 7,000 square miles, or 4,480,000 acres.	
Number of acres assessed	1,177,553
Value of country real estate	$10,208,985
Of improvements thereon	$3,611,448
Of city and town lots	$2,659,307
Of improvements thereon	$3,358,200
Of personal property	$2,382,398
Total value of all property	$22,218,835
Expended on roads, last fiscal year	$136,607
Expended for bridges, last fiscal year	$6,203

General Statistics—Continued.	
Number of miles of public roads	2,000
Road levy per $100, 1910	60c
Value of county buildings	$388,437
Irrigating ditches — miles, 132; cost	$1,688,537
Railroads, steam—miles, 210.369; assessed value	$4,706,996
Railroads, electric—miles, 16.69; assessed value	$28,765
Electric power plants — 1; assessed value	$50,937
Electric power lines—miles, 16.5; assessed value	$3,555

STATISTICS OF RIVERSIDE COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Tons of 2,000 pounds. Acres.	Bushels.	Value.
Wheat	4,398	28,282	$39,936
Barley	66,855	715,550	417,450
Oats	3,170	36,630	43,060
Corn	50	2,250	2,250
Total cereals	74,473	782,712	$502,696
	Acres.	Tons.	Value.
Alfalfa hay	11,607	66,400	$600,334
Grain hay	37,281	28,710	297,240
Total hay	48,888	95,110	$897,574

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	1,758	4,524	6,282
Apricot	44,726	42,606	87,332
Cherry	55	79	134
Fig	190	635	825
Lemon	91,345	51,871	143,216
Nectarine	21	75	96
Olive	52,720	20,147	72,849
Orange	1,254,156	86,152	1,340,308
Peach	24,743	27,572	52,315
Pear	7,934	775	8,709
Plum	190	500	690
Prune	5,566	70	5,636
Quince	15	41	56
Total fruit			1,618,448
Almond	1,120	31	1,151
Walnut	2,975	16,563	19,538
Total nut			20,689
Grapevines (acres)	2,850	27	2,877
Berries (acres)	8		8

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	45,100	$710
Apricots	3,003,000	27,995
Blackberries	2,500	125
Beets	2,000	80
Cabbage	56,000	950
Cherries	30,000	2,500
Figs	6,000	120
Grapes	9,460,000	73,600
Grape fruit	8,355	24,538
Lemons (boxes)	459,765	1,325,647
Onions	676,500	12,875
Oranges (boxes)	1,495,006	2,137,530
Olives	696,000	19,601
Pears	575,000	8,170
Peaches	2,098,000	14,260
Plums	87,050	730
Irish potatoes	270,000	3,500
Sweet potatoes	25,000	500
Tomatoes	325,000	9,500
Cantaloupes	1,500,000	20,000
Watermelons	700,000	4,500
Total value		$3,697,431
Dried—	Pounds.	Value.
Almonds	130,000	15,600
Apricots	352,300	31,230
Onions	1,200	240
Pears	15,000	1,000
Peaches	72,000	3,840
Prunes	250,000	10,000
Raisins	120,000	3,500
Walnuts	12,000	1,560
Total value		$66,970

Dairy Industry.

	No.	Production.	Value.
Creameries	4		$11,950
Butter (pounds)		471,813	161,229
Sweet milk (gals.)		214,710	82,413
Total value			$255,592

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	161,500	$120,550
Sweet wines	225,000	170,000
Brandy	96,000	144,000

Number of wineries, 3; number of distilleries, 1.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	330	$11,950
Stock	3,210	64,250
Dairy Cows—Graded	1,359	65,785
Thoroughbred—		
Holsteins	126	8,820
Jersey	182	12,740
Shorthorns	94	6,580
Calves	569	6,489
Swine	1,886	19,271
Horses—Thoroughbred	3	4,500
Standard-bred	1,395	187,850
Common	1,545	122,505
Colts	409	20,970
Jacks and jennies	12	7,160
Mules	505	89,600
Sheep	4,700	20,100
Lambs	2,120	6,240
Common goats	87	292
Total value		$655,102
Wool (pounds)	20,000	2,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	3,902	$28,290
Ducks	44	285
Geese	25	299
Turkeys	700	14,760
Eggs	428,633	122,858
Total value		$166,492

Power used for mills and manufactories in county—Steam (number), 4; electrical (number), 8.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	11,092	$31,089
Beeswax	2,665	733
Broomcorn	10,000	750
Flowers and plants (acres)	3½	7,000
Honey—Comb	24,030	2,879
Extracted	301,280	18,095
Alfalfa seed	45,900	4,590
Cotton	125,000	22,500

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	1	6	$8,000
Brick	2	18	28,000
Cement	1	375	214,500
Cigars	2	7	17,500
Crushed rock	3	175	.....
Confectionery	5	21	45,000
Foundries and iron works	3	87	143,500
Ice	1	17	146,000
Sewer pipe	2	110	181,000
Pressed firebrick	..	.....	88,000
Planing mills	2	65	146,000
Artificial stone—Pipe	2	8	22,400
Blocks	2	7	20,500
Granite	2	9	24,975
Cotton gin	1	.....	.....

Manufactured Output.

	Quantity.
Brick	250,000
Cement (tons)	13,000
Cigars	350,000
Ice (tons)	18,250
Crushed rock (tons)	185,730

SACRAMENTO COUNTY.

Sacramento County, with its 987.66 square miles (or 632,108 acres) of area, is one of the largest in the Sacramento Valley, as well as one of the oldest in the State, having been organized by the first legislature. Its principal cities and towns are: Sacramento, Folsom, Galt, Elk Grove, Fair Oaks, Courtland, Oak Park, Walnut Grove, Isleton, Franklin, and Cosumnes.

Its area is almost all rich, alluvial plain, ranging from 30 to 125 feet above sea level, rising gradually from the rivers to meet the low rolling foothills of the Sierra Nevada Mountains.

The Sacramento River is the longest and largest in the State, and is navigable from Red Bluff to San Francisco Bay, giving unexcelled transportation facilities, landing freight on deep water vessels at a minimum of cost. The river traverses the western boundary of the county in a tortuous manner for about ninety miles across the rich bottom or delta lands, cutting them up into numerous small and several large islands, said to be the richest land in the world.

The American River rises in the upper Sierra and enters the county at the northeast corner among the low foothills, flowing in a southwesterly direction and emptying into the Sacramento just north of the city of Sacramento.

In addition to the numerous rivers and streams, there is underlying the entire area of the county an inexhaustible supply of pure and excellent water, which rises to within a few feet of the surface, and is easily appropriated by means of a light lifting power, insuring an unlimited supply for irrigation and domestic purposes.

The natural fish in the rivers are salmon, sturgeon, pike, perch, hardheads, and dace. Those planted are striped bass, black bass, shad, and three kinds of catfish. The only fish propagated is the salmon, in the headwaters of the Sacramento. All of the planted fish have multiplied satisfactorily. In the open season large numbers of salmon and other fish are taken and sold in the local and San Francisco markets.

In the line of game are geese, ducks, quail, curlew, doves, and larks. All but the geese are protected. The ducks are mostly migratory. Of the non-migratory species are the mallard, spoonbill, and wood duck.

General John A. Sutter settled in Sacramento in 1837, and was the first agriculturist in the Sacramento Valley. He received the concession of a large tract of land from the Mexican government, and located a fort near the junction of the Sacramento and American rivers. His first wheat field was a portion of the land now covered by the city of Sacramento. He planted the first fruit trees and grapevines, and demonstrated the unsurpassed fertility of the soil of the great valley to the north.

The richness of the soil is due largely to the fact that in remote ages the entire Sacramento Valley and a section of the foothills, to an altitude of several hundred feet, were portions of the bed of an inland sea, and that into this sea the washings of the surrounding mountains were precipitated, forming what has been shown by analyses to be exceptionally fertile soil.

Sutter's demonstration of the productiveness of the soil encouraged others to continue the work, and enormous profits were made on all farm products, although the greatest areas of the county and valley were devoted to grains, such as wheat, barley, etc. Later, settlers undertook the planting of large orchards, and as there was a constantly increasing demand in the eastern markets for California fruits, the acreage was increased in an attempt to keep pace with the demand. Portions of Sacramento County were found to be especially adapted to the growth of oranges and other citrus fruits, oranges ripening from four to six weeks earlier than those of southern California, and large areas were and are being planted. Fruits of all kinds, citrus, deciduous, natives of the temperate, semi-tropic, and many of those of the tropic zones, are successfully grown on the lands of the county. The largest Tokay vineyard in the world is in Sacramento County. The largest cherry orchard in the State is projected and being planted, and there are still thousands of acres awaiting the hand of the orchardist.

Strawberries are marketed here eleven months in the year, and fresh vegetables are obtainable the year round. The largest asparagus beds in the world are within the confines of Sacramento County. Alfalfa grows luxuriantly without irrigation on the rich bottom lands, producing from four to eight tons to the acre.

Apricots ripen early, and of all the countries in the world, California stands alone as having made a thorough success of the cultivation of this delicious fruit, and in Sacramento County it reaches its finest development in size and flavor and productiveness.

The almond, one of the most difficult of all crops because of its susceptibility to frost, is exceptionally profitable here, and a large colony at Antelope has given its entire attention to this most profitable nut.

The English soft-shell walnut has been demonstrated to be a profitable crop, and it is expected that in the next few years large acreages will be devoted to its cultivation.

The olive is constantly increasing in favor and netting splendid returns to the growers. Some of the finest olive lands in the world are in the confines of the county.

The dry atmosphere is especially suited for the drying of fruits, and the article so produced is regarded as first-class in the markets of the world.

The farmer is sure of a good market for all of his surplus fruit, as the California Fruit Canners' Association and the Central California Canneries are located within the county, and handle enormous quantities of fruits and vegetables. These canneries operate a longer period of the year than in any other section of the United States, beginning on asparagus the latter part of March and ending the latter part of November on beans and tomatoes.

The river districts are the most prolific producers of beans in the world, and great quantities are shipped annually to the East. Broomcorn, Egyptian corn, potatoes (both sweet and Irish), asparagus; in fact, all kinds of vegetables thrive and yield splendid profits, many of them having two growing seasons. It is quite common to market two crops from the same land every year.

Along the Sacramento, American, and Cosumnes rivers are the most productive hop fields in the United States. Hop culture on this coast dates back to 1858. It was early demonstrated that the soil and cli-

mate of Sacramento County are unsurpassed for hop culture, and it is the only place known where a crop of from 1,000 to 2,000 pounds per acre can be grown the first year the roots are planted. It is a common occurrence to grow 2,000 to 3,000 pounds on an acre of ground, and in some instances 4,000.

Sacramento County presents splendid opportunities to the live stock breeder and the dairyman. There are a number of large creameries in the county and the largest and most modern dairy on the coast is located here. The climate is so temperate and mild that animals remain in the open air practically unsheltered the year round without hardship. The soil, because of its fertility, is peculiarly adapted to the growth of forage crops, especially alfalfa, which is at the same time one of the cheapest of stock feeds.

Hogs are raised generally by the farmers, and pedigreed Poland China, Berkshire, and Essex swine are bred quite extensively, and have proven very profitable.

Poultry raising has steadily increased in importance in the last few years. Elk Grove, Galt, and Folsom are among the principal poultry raising districts, and in the outskirts of Sacramento City this has been made a specialty by many with profit.

There are a number of wineries in the county. The output is shipped all over the world, but is principally disposed of in the United States, Central America, and the islands. The port is not heavy in body nor dark in color, but is delicate and light, having great character, and resembling closely the light, high-grade ports of Portugal. The county has a great reputation for fine sherry.

Many new industries are augmenting the large list of those in the county, notably among which are the Sacramento Soap Factory, two brick factories, and several minor ones. Negotiations have been closed, recently, for the establishment of a factory for the manufacture of automobiles.

The largest rock-crushing plant in the world is located in the county, supplying many thousands of tons of crushed rock for the many uses made of it.

Sacramento is the railroad center of the State, and many new lines are either building or projected, radiating in all directions from the capital city, the home of the main shops of the Southern Pacific and Western Pacific systems. Splendid interurban service from Sacramento to Chico is given by the Northern Electric Railway Company; and by the Central California Traction Company, also an electric line, from Sacramento to Stockton.

The Southern Pacific and California Transportation Company operate passenger, as well as freight steamers, touching the various river points. Several of these steamers are palatial in their fittings, providing every comfort for the passenger, and this mode of travel is deservedly popular. Several minor companies operate freight steamers not only to San Francisco, but north as far as Red Bluff, giving low transportation rates to all points touched by the river.

In the splendid rail and water transportation facilities (having two great transcontinental lines passing through the city and being connected with the third, the Santa Fe, by the Central California Traction Company, at Stockton, giving competing rates to all points East), Sac-

ramento is endowed with advantages equaled by no other city on the coast. Practically unlimited electrical power is generated in the foothills and high Sierra and delivered into the city by the Great Western Power Company and the Sacramento Electric, Gas and Railway Company for factory, heating, lighting, and street railway purposes, at a low cost.

Situated on the east bank of the Sacramento River, 90 miles distant by rail from San Francisco, the seat of state and county government, the city is rapidly taking first place as a commercial center, having some of the largest jobbing houses on the coast, and splendid retail stores catering to the wants of the residents of California, southern Oregon, and Nevada. It is the largest mail-order center west of Chicago, practically controlling this branch of the trade.

The magnificent State Capitol is one of the most symmetrical in outline of any in the United States. The building is located in a beautiful park of thirty-five acres in the heart of the city. This park is unique, containing over three hundred varieties of trees and shrubs from every known climate of the globe, a practical demonstration of the remarkable climate of this section of the State.

The city owns the finest art gallery in the West. Sutter's Fort has been restored to the same condition as when built by the general in 1839, and stands as a testimonial of the hardships endured by the early settlers. The fort is situated in a park of four acres in extent and is of intense interest to tourists. New buildings are springing up on every hand; buildings that would be a credit to cities double the size. The last Federal census shows an increase of over 52 per cent over the report of the last enumeration. The new high school building has recently been completed at a cost of a quarter of a million of dollars. Churches, educational facilities, and amusement features are unsurpassed. The Federal building, of red sandstone, costing $200,000, accommodates the post office, internal revenue, and land offices, and the weather bureau station. The water works are the property of the city. Natural gas wells in the city yield an abundance of gas for domestic purposes, heating, and cooking.

The climate is particularly adapted to outdoor life. One can drive in any direction and wind through beautiful country of vineyards, orchards, and fields, and lands covered with beautiful natural oaks. Where one wants a day's pleasure beyond the limits of the county, it is an easy matter to ride on the trains from roses to snow in the high Sierra.

Over one hundred and four miles of oil-macadam roads have been constructed in the past two years, making arteries radiating in all directions to the county's boundaries. These roads are as level as a table, and constructed for years of service.

STATISTICS OF SACRAMENTO COUNTY, 1909-10.

General Statistics.

Area 987.66 square miles, or 632,108 acres.

Number of farms	1,800
Number of acres assessed	610,720
Value of country real estate	$13,934,430
Of improvements thereon	$1,874,320
Of city and town lots	$3,701,500
Of improvements thereon	$1,472,410
Of personal property	$2,894,755
Total value of all property	$58,620,075
Expended on roads, last fiscal year	$512,990
Expended for bridges, last fiscal year	$137,413
Road levy per $100, 1910	47c
Value of county buildings	$477,995
Irrigating ditches, cost	$117,500
Railroads, steam—miles, 147.96; assessed value	$2,950,831
Railroads, electric—miles, 49.2; assessed value	$87,630
Electric power plants (number)	3
Electric power lines (miles)	63

Cereal Products and Hay.

	Acres.	Tons. (Tons of 2,000 pounds.)	Value.
Wheat	40,000	12,500	$225,000
Barley	12,500	6,000	175,000
Oats	100,500	250,000	75,000
Rye	450	125	4,500
Corn	700	200	6,000
Buckwheat	100	25	750
Total cereals	154,250	43,850	$486,250
Alfalfa hay	45,000	200,000	$2,000,000
Grain hay	33,500	45,000	402,000
Total hay	78,500	245,000	$2,402,000

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	400,000	$60,000
Sweet wines	200,000	360,000
Beer (barrels)	160,000	1,200,000
Brandy	10,000	15,000
Grape juice	5,000	2,500

Number of wineries, 10; number of distilleries, 10; number of breweries, 2.

Dairy Industry.

	Production.	Value.
Butter (pounds)	2,730,000	$950,000
Cheese (pounds)	1,550,000	175,000

Creameries, 6; skimming stations, 5.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	27,000	500	27,500
Apricot	40,000	20,000	60,000
Cherry	35,000	5,000	40,000
Fig	4,000	500	4,500
Lemon	6,000	500	6,500
Nectarine	1,200	250	1,450
Olive	28,000	3,000	28,000
Orange	60,000	5,500	65,500
Peach	145,000	28,000	173,000
Pear	340,000	20,000	360,000
Plum	100,000	12,000	112,000
Prune	65,000	9,500	74,500
Quince	1,150	200	1,350
Other kinds	12,000	1,000	13,000
Total fruit	861,350	105,950	967,300
Almond	72,000	8,000	80,000
Chestnut	1,500	500	2,000
Pecan	2,700	950	3,650
Walnut	6,000	1,000	7,000
Other nuts	5,000	1,000	6,000
Total nut	87,200	11,450	98,650
Grapevines	400,000	25,000	425,000
Berries, acres.	5,000	1,500	6,500

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	403,000	$10,000
Apricots	2,200,000	32,000
Asparagus	20,000,000	200,000
Blackberries	100,000	650
Beans	175,000,000	2,500,000
Beets	1,500,000	23,500
Cabbage	3,500,000	33,000
Celery	300,000	5,800
Cauliflower	15,500	750
Corn	85,000	1,875
Currants	250,000	12,400
Cherries	225,500	16,600
Figs	150,000	5,500
Gooseberries	28,000	2,000
Grapes	28,000,000	155,900
Grape fruit	5,300	550
Limes (boxes)	6,500	25,000
Lemons (boxes)	24,000	96,000
Loganberries	9,900,000	200 000
Nectarines	25,000	1,200
Onions	35,000,000	525,000
Oranges (boxes)	45,800	46,000
Olives	125,000	3,700
Pears	22,000,000	1,500,000
Peaches	15,000,000	125,000
Peas	300,000	10,000
Persimmons	2,000	185
Plums	8,100,000	125,000
Irish potatoes	100,000,000	900,000
Sweet potatoes	65,000	700
Prunes	6,250,000	100,000
Quinces	2,100	25
Raspberries	75,000,000	102,500
Strawberries	15,200,000	250,000
Tomatoes	7,000,000	92,500
Totals	478,307,700	$8,553,330

Dried—	Pounds.	Value.
Almonds	1,000,000	$100,000
Apples	60,500	3,500
Apricots	424,800	15,500
Beans	14,000,000	2,000,000
Chestnuts	12,500	1,150
Figs	85,000	2,550
Nectarines	5,000	325
Onions	34,900,000	375,000
Pears	400,000	16,500
Peaches	2,100,000	9,750
Peas	168,500	7,800
Plums	1,400,000	85,000
Prunes	1,250,000	40,000
Raisins	500,000	13,000
Walnuts	33,500	5,500
Totals	182,339,800	$2,599,075

Canned—	Cases.	Value.
Apples	12,500	$25,000
Apricots	28,000	56,000
Blackberries	6,000	33,000
Beans	5,000	20,000
Cherries	16,000	50,000
Grapes	23,000	66,000
Pears	7,000	225,000
Peaches	10,000	300,000
Plums	25,000	55,000
Raspberries	8,500	18,500
Strawberries	11,500	40,500
Tomatoes	90,000	360,000
Asparagus	230,000	1,380,000
Squash	10,000	25,000
Pumpkin	10,000	25,000
Totals	647,500	$2,679,000

Fish Industry.

	Pounds.	Value.
Salmon	835,200	$88,500
Other kinds	900,000	72,000
Totals	1,735,200	$160,500

STATISTICS OF SACRAMENTO COUNTY, 1909-10.

Live Stock Industry.

	Number.	Value.
Cattle—Beef	35,805	$616,100
Stock	20,000	400,000
Dairy Cows—Graded	14,025	325,000
Swine	57,500	287,500
Horses—Thoroughbred	300	450,000
Standard-bred	1,670	334,000
Common	17,650	1,175,000
Colts	4,200	40,000
Jacks and jennies	300	10,000
Mules	3,000	600,000
Sheep	51,452	205,710
Common goats	300	.....
Wool (pounds)	300,000	.....
Mohair (pounds)	25,000	.....

Poultry and Eggs.

	Dozen.	Value.
Chickens	310,000	$1,520,300
Ducks	400	2,400
Geese	350	5,100
Turkeys	2,200	55,000
Eggs	1,490,000	300,000
Total value		$1,882,800

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	80,000	.....
Charcoal (sacks)	35,000	$15,000
Fuel, wood (cords)	10,000	70,000

Power used for mills and manufactories in county—Electrical (16,000 horse-power).

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	2,200	$6,100
Beeswax	2,000	520
Flowers and plants (acres)	50	50,000
Honey	75,000	10,000
Hops	3,833,060	459,967
Alfalfa seed	60,000	.....

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	2	20	.....
Paper boxes	1	8	.....
Wood boxes	2	13	.....
Brick	2	88	$150,000
Brooms	2	22	40,000
Carriages and wagons	7	120	.....

Manufactories—Continued.

	No.	Number of Employees.	Value of Products.
Cement	2	12	$18,500
Cigars	18	115	250,000
Coffee, spices, etc.	6	20	150,000
Confectionery	10	225	150,000
Cooper-shops	2	12	35,000
Crackers	2	42	150,000
Electrical supplies	2	12	150,000
Flouring mills	4	150	2,000,000
Foundries and iron works	5	45	85,000
Furniture	3	45	75,000
Jewelry	7	4	8,500
Leather goods	7	80	130,000
Machinery	13	180	500,000
Malt	6	35	150,000
Meat products—			
Hides	..	.....	65,000
Lard	..	.....	75,000
Meat packed	..	.....	50,000
Tallow	..	.....	220,000
Olive oil	..	.....	2,500
Pickles	4	15	22,000
Pickled olives	..	.....	15,000
Iron pipe	2	58	275,000
Sewer pipe	2	15	38,000
Planing mills	11	225	500,000
Potteries	3	15	35,000
Soap	1	25	150,000
Artificial stone	6	40	130,000
Granite	6	30	112,000
Syrups and extracts	3	27	65,000
Tin and galvanized iron	10	170	250,000
Wood turning and carving	4	12	20,000
Sauerkraut	..	.....	5,000
Paste	2	15	50,000

Manufactured Output.

	Quantity
Brick	20,000,000
Brooms (dozen)	8,000
Cement (tons)	5,000
Cigars (thousand)	5,500
Crackers (pounds)	18,000
Flour (barrels)	400,000
Malt (tons)	3,200
Hides (pounds)	725,000
Lard (pounds)	500,000
Meat packed (pounds)	20,000
Tallow (barrels)	45,500
Olive oil (gallons)	5,000
Pickles (gallons)	3,000,000

SAN BENITO COUNTY.

The county extends from northwest to southeast about sixty miles with a general breadth of twenty miles. The Gabelan Mountains on the southwest constitute the dividing line from Monterey County, and at their base flows northerly, the entire length, the San Benito River. Farther east the Tres Pinos forms another valley.

Irrigation is by gravity from the San Benito River and the Tres Pinos. The system is being rapidly improved by the San Benito Land and Water Company. This is supplemented by an extensive system of pumping from an apparent inexhaustible supply of underground flow, and further by artesian wells in the northern end of the county.

The San Juan Portland Cement Company's plant is not yet in operation.

The lime industry, though once large, has ceased, awaiting better transportation facilities.

The quicksilver product of the New Idria Mines goes on unceasingly. Furnaces are practically finished at two new mines, the Esmeralda and the Bradford.

Large deposits of potter's clay of superior quality lie easy of access, as well as sandstone and lime rock quarries.

Gypsum is heavily mined in the southern end of the county and a rock crushing plant is in the northern end.

Much development work for petroleum is going on in the southeast part of the county, and with good prospects.

STATISTICS OF SAN BENITO COUNTY, 1909-10.

General Statistics.

Area 1,056 square miles, or 676,000 acres.

Number of farms	1,300
Number of acres assessed	584,184
Value of country real estate	$4,370,005
Of improvements thereon	$745,665
Of city and town lots	$461,040
Of improvements thereon	$559,410
Of personal property	$1,314,385
Total value of all property	7,664,315
Expended on roads, last fiscal year	$19,857
Expended for bridges, last fiscal year	$1,600
Number of miles of public roads	114
Road levy per $100, 1910	33c
Value of county buildings	$128,000
Irrigating ditches (cost)	$75,000
Railroads, steam—miles, 24.45; assessed value	$456,639
Electric power plants—1; assessed value	$26,250
Number of acres irrigated	4,600

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	60,000	$12,000
Beer (barrels)	1,636	10,635
Brandy	1,000	400

Number of wineries, 1; number of distilleries, 1; number of breweries, 1.

Dairy Industry.

	Production.	Value.
Butter (pounds)	250,000	$67,500
Cheese (pounds)	477,600	.....

Creameries, 1.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	2,000	39,360	$30,700
Barley	25,000	50,353	20,141
Oats	10,000	54,100	23,804
Corn	30	357	250
Total cereals	37,030	144,170	$74,895

	Acres.	Tons.	Value.
Alfalfa hay	1,500	4,500	$45,000
Grain hay	35,000	45,000	405,000
Total hay	36,500	49,500	$450,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	8,750	$300,000
Stock	15,290	244,640
Dairy Cows—Graded	2,466	61,655
Thoroughbred—Shorthorns	80	5,000
Calves	3,440	33,295
Swine	2,827	13,420
Horses—Thoroughbred	43	8,275
Common	4,032	164,010
Colts	1,814	37,000
Jacks and jennies	1	150
Mules	45	1,760
Sheep	10,628	21,255
Lambs	4,600	4,600
Common goats	270	270
Total value		$895,420
Wool (pounds)	126,200	19,000

STATISTICS OF SAN BENITO COUNTY, 1909-10—Continued.

Poultry and Eggs.

	Dozen.	Value.
Chickens—		
In county	8,800	$38,500
Shipped to market	4,165	19,800
Ducks	145	715
Geese	13	165
Turkeys	230	6,500
Eggs	9,856	.....
Total value		$256,530

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	2,200,000	$33,000
Apricots	985,022	16,170
Blackberries	27,500	1,376
Beets	5,250	55
Cabbage	21,000	1,575
Cauliflower	10,500	525
Corn	105,000	2,100
Cherries	100,000	4,500
Grapes (table)	60,000	600
Loganberries	135,000	6,075
Pears	1,160,000	21,750
Peaches	720,000	9,000
Plums	125,000	3,000
Irish potatoes	1,100,000	13,750
Raspberries	34,100	1,705
Strawberries	1,210,000	35,350
Tomatoes	5,000,000	42,000
Total		$192,330

Dried—	Pounds.	Value.
Almonds	80,000	$8,800
Apricots	140,000	126,000
Onions	390,600	2,855
Peaches	120,000	6,000
Prunes	2,800,000	112,000
Walnuts	30,000	3,000
Silver prunes	200,000	14,000
Total		$272,655

Canned—	Cases.	Value.
Apricots	1,250	$3,750
Pears	410	1,722
Tomatoes	500	900
Total		$6,372

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	17,000	1,200	18,200
Apricot	36,000	2,000	38,000
Cherry	2,200	.....	2,200
Peach	15,000	1,000	16,000
Pear	7,000	.....	7,000
Prune	125,000	20,000	145,000
Quince	12	.....	.....
Total fruit	202,200	24,200	226,400
Almond	4,500	.....	4,500
Walnut	400	.....	400
Total nut	4,900	.....	4,900
Grapevines	305,500	.....	140
Berries, acres.	140	.....	.....

Forest Products.

	Amount.	Value.
Fuel, wood (cords)	5,000	$30,000

Power used for mills, manufactories, and pumping plants in county—Steam (number), 13; electrical (number), 21; water (number), 1; gasoline (number), 18.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	590	$590
Honey	17,700	1,475
Garden seed	950,000	162,500
Sugar beets (tons)	6,600	33,000
Dressed veal	28,700	2,590
Dressed hogs	17,500	1,400

Manufactories.

	No.	Number of Employees.	Value of Products.
Cigars	1	2	$7,000
Confectionery	2	4	3,375
Meat products—			
Hides	..	.....	14,500
Lard	..	.....	5,300
Meat packed	..	.....	4,250
Tallow	..	.....	1,000
Planing mills	1	3	6,500

Manufactured Output.

	Quantity.
Cigars	190,000

SAN BERNARDINO COUNTY.

San Bernardino is not only the largest county in California, but it is the largest in the United States. It is larger than New Hampshire, Vermont, and Rhode Island combined; larger than New Jersey, Delaware, Massachusetts, and Rhode Island combined; very nearly as large as Massachusetts, Connecticut, and New Jersey. There are eight states whose area is less than that of this county.

San Bernardino County is in the southeastern part of the State. The greater portion is desert. In the north is the Mojave Desert, and in the east the northern end of the Colorado Desert, the arable portion being confined to the southwestern part—the San Bernardino Valley. This valley forms an almost perfect amphitheater, encircled by mountains and hills, open only on the west, allowing the sea breeze from the ocean to sweep its entire length.

Mount San Gorgonio is perpetually snow-capped, and from it is derived much of the water used for irrigation in the summer in the valley below, the remainder coming from the mountain range, giving a bountiful supply for irrigators. The combined waters of the streams, springs, and artesian wells make this valley one of the best watered in southern California.

The forests on the mountain ranges furnish the supply of lumber and timber used in the valley.

Mount San Bernardino, from its distinctive cone, has been adopted by the United States surveyors as the initial point for land surveys in southern California, both base and meridian starting from its peak.

The northern and eastern parts of the county are almost absolutely sterile. Yet, along the Mojave River, where it debouches from the mountains to the desert, and for many miles, the land on both sides is fertile, easily worked, and produces abundantly as long as the water supply is available.

The soil of San Bernardino Valley varies greatly with locality. In the eastern part it is a sharp gravel or sand, with a large admixture of alluvial deposits. West the soil changes to a heavy, lark loam, with occasional patches of adobe. Still farther west, the soil is of a lighter character, and possesses much more of the soda and potash constituents. Immediately about the city of San Bernardino the soil is a strong adobe, with appearances here and there of soda salts. Along the river bottom the soil is a heavy clay, and in some places a black adobe. It is cold and damp, and not as suitable for fruit culture as for grazing and the growing of hay.

The rainfall varies a great deal, as does the climate. Passing from the lower levels to the high altitudes the rainfall increases. On the north and east of the mountain ranges, on the Mojave and Colorado deserts, the larger portion of the rainfall comes in July and August, with no rains during the winter. The rains are short, sharp, and heavy, frequently accompanied by thunder and lightning, which latter is almost unknown south of the mountains.

In the number and character of irrigation enterprises, the county stands in the front rank. It has been justly called the "Mother of Irri-

gation," because here was dug the first irrigation ditch in the State, and here were raised the first crops by irrigation. It is over a hundred years since the mission fathers of San Gabriel established an outlying post, or submission, just west of Redlands, and employed Indian labor to dig what is known as the zanja. This ancient ditch is still in use and within the same banks that were first thrown up by Indian labor almost a century ago.

There are hundreds of miles of canals and pipe lines, with thousands of miles of laterals and individual pipe lines. In addition to this, hundreds and hundreds of wells have been bored, each producing a flowing stream without other or further expense, which volume is sufficient not only to irrigate many thousands of acres, but also furnishes the magnificent supply which fructifies and renders fertile the great plain on which the city of Riverside stands.

Almost every variety of fruit can be produced in some part of this county. The only exceptions are those strictly tropical. In the mountain valleys and upon the upper plateaus, apples and cherries are grown. On the lower levels, all the deciduous fruits are produced. The production of oranges, lemons, and pomelos is large, these fruits being grown to perfection. The production of oranges has increased rapidly during the last few years. The first plantings of orange trees were two set out by Anson Van Leuven in his dooryard in Old San Bernardino in the early sixties, and by M. H. Crafts at Crafton, at about the same time or a little later.

In the western part of Rialto, Etiwanda, and Cucamonga neighborhoods there is produced a large quantity of raisins. Another section of the county especially adapted to the culture of grapes is that about Hesperia, which lies along the Mojave River.

In the southwest corner of the valley is located the Chino Ranch, on which is the third largest beet-sugar factory in the world. The acreage devoted to sugar-beet culture is in the neighborhood of 20,000. The factory has a capacity of about 12,000 tons of refined sugar annually. The culture of sugar beets has been a profitable industry for the farmers. On this ranch are fattened thousands of head of cattle upon the beet pulp, which is siloed for that purpose.

Along the slope of the mountains, and in the mountain valleys and canyons, are numerous bee ranches, from which is produced a large amount of honey.

The raising of cattle and sheep is carried on along the mountain ranges and in the upper mountain valleys. Several large bands of sheep are grazed on the ranges. Dairying is carried on in both the upper and lower valleys. Pure-bred or grades of high-class dairy cattle are in general use. A stock company for the breeding of the most desirable classes of horses has a large ranch at Victor to be devoted exclusively to their raising.

Wheat, oats, and barley are grown in considerable quantities, and alfalfa is raised with profit.

Vegetables of nearly all descriptions are raised, the yield being large, and a growing shipping trade to outside markets has been established.

The northern and eastern portions are heavily mineralized, and although prospecting has been carried on for fifty years, new and greater finds are being made every year. Almost every known mineral

has been discovered. Gold, silver, copper, iron, tin, lead, borax, soda, and nitrates are found in abundance and scattered over a wide area. Some of the richest silver mines in the State are in this county. Copper exists in great abundance. The high cost of freight; the scarcity of water, which renders the life of the prospector precarious, as well as interfering with the working of the mines; the scarcity and high cost of fuel—all combined have limited prospecting and retarded mining development. The building of railroads across the desert has partially removed some of these obstacles, and mining recently has be n prosecuted with more vigor.

STATISTICS OF SAN BERNARDINO COUNTY, 1909-10.

General Statistics.

Area 20,160 square miles, or acres.	12,902,400
Number of farms	5,685
Number of acres assessed	893,745
Value of country real estate	$16,649,790
Of improvements thereon	$7,680,500
Of city and town lots	$4,198,425
Of improvements thereon	$5,669,365
Of personal property	$2,769,650
Total value of all property	$36,967,730
Expended on roads, last fiscal year	$184,105
Expended for bridges, last fiscal year	$30,943
Number of miles of public roads	2,160
Road levy per $100, 1910	45c
Value of county buildings	$460,000
Irrigating ditches — miles, 440; cost	$3,895,000
Railroads, steam — miles, 713; assessed value	$12,999,332
Railroads, electric — miles, 53; assessed value	$185,805
Electric power plants — 2; assessed value	$625,000
Electric power lines—miles, 206; assessed value	325,525
Number of acres irrigated	49,960

Dairy Industry.

	Production.	Value.
Butter (pounds)	180,000	$54,000
Creameries, 2.		

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	20,200	3,500	23,700
Apricot	26,200	.....	26,200
Cherry	15,600	.....	15,600
Fig	2,650	.....	2,650
Lemon	222,200	1,500	223,720
Nectarine	2,375	.....	2,375
Olive	54,000	.....	54,000
Orange	3,160,200	145,000	3,295,200
Peach	8,250	.....	8,250
Pear	18,500	.....	18,500
Plum	2,700	.....	2,700
Prune	2,800	.....	2,800
Other kinds	7,500	.....	7,500
Total fruit	3,543,175	150,000	3,683,175
Almond	1,500	.....	1,500
Walnut	6,800	1,500	8,300
Total nut	8,300	1,500	9,800
Grapevines, acres	22,870	2,500	.....
Berries, acres.	100	.....	.....

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	2,400,000	$71,250
Apricots	6,512,000	52,075
Blackberries	92,500	9,375
Beans	.....	35,600
Beets	.....	28,000
Cabbage	.....	89,000
Cauliflower	.....	2,500
Corn	.....	41,500
Cherries	140,000	9,800
Figs	15,000	1,500
Grapes	98,500,000	526,600
Grape fruit (boxes)	19,800	41,580
Lemons (boxes)	225,615	753,554
Loganberries	19,800	2,050
Nectarines	.....	500
Onions	85,000	1,550
Oranges (boxes)	.....	5,023,770
Olives	450,000	15,625
Pears	1,050,000	27,900
Peaches	10,944,000	84,080
Peas	.....	26,750
Plums	180,000	4,500
Irish potatoes	2,300,000	24,500
Sweet potatoes	30,000	650
Prunes	600,000	2,400
Raspberries	17,500	1,750
Strawberries	180,000	16,200
Tomatoes	1,600,000	6,400
Miscellaneous	2,000,000	9,000
Total value		$6,910,159

Dried—	Pounds.	Value.
Almonds	4,500	$650
Apricots	810,000	58,725
Figs	2,200	340
Onions	14,000	400
Peaches	640,000	24,000
Prunes	100,000	2,250
Raisins	3,200,000	90,600
Walnuts	20,000	2,600
Total value		$179,565

Canned—	Cases.	Value.
Apricots	31,700	66,570
Cherries	600	2,340
Pears	575	1,610
Peaches	1,067,002	13,400
Plums	680	1,190
Miscellaneous	13,000	27,400
Total value		$312,510

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	1,030,000	$128,000
Sweet wines	1,140,000	214,500
Brandy	192,000	61,500
Vinegar	90,000	7,500
Total value		$411,500

Number of wineries, 12.

STATISTICS OF SAN BERNARDINO COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres. (Tons of 2,000 pounds.)	Tons.	Value.
Barley	4,700	2,450	$42,900
Oats	100	75	2,575
Corn	2,500	1,200	35,400
Total value			$80,875
	Acres.	Tons.	Value.
Alfalfa hay	8,700	61,880	$679,900
Grain hay	2,500	23,000	276,000
Grass hay		600	3,600
Total value			$959,500

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	287,000	
Cedar (acres)	28,000	
Pine (acres)	259,000	
Sawmills (number)	3	$50,000
Charcoal (sacks)	3,000	1,200
Fuel, wood (cords)	14,000	77,000
Lumber (feet)	12,000,000	215,000
Sash and door factories (number)	2	21,000
Total value		$364,200

Poultry and Eggs.

	Dozen.	Value.
Chickens	8,000	$40,000
Ducks	100	600
Geese	50	500
Turkeys	825	13,000
Eggs	840,000	226,800
Total value		$280,900

Miscellaneous Products.

	Pounds.	Value.
Bees (hives) number.	11,500	$40,250
Beeswax	5,000	1,250
Flowers and plants (acres)	195	176,000
Honey	450,000	27,000
Alfalfa seed	8,000	1,200
Syrup (gallons)		3,000
Sugar beets (tons)	40,000	220,000
Beet pulp		42,500
Alfalfa meal		40,000
Gold		175,000
Silver		20,000
Copper		15,000
Lead		10,000
Tungsten		120,000
Crushed rock		125,000
Marble dust		1,200
Plaster		75,000
Paving blocks		35,000
Salt		50,000
Total value		$1,188,700

Live Stock Industry.

	Number.	Value.
Cattle—Beef	10,800	$594,000
Stock	14,400	288,000
Dairy Cows—Graded	875	35,000
Calves	3,600	36,000
Swine	8,900	97,000
Horses—Thoroughbred	18	18,000
Standard-bred	350	87,500
Common	14,000	1,330,000
Colts	900	18,000
Mules	500	75,000
Total value		$2,578,500

Manufactories.

	Value.
Bookbinderies	$4,600
Wood boxes	205,000
Brick	21,000
Cement	800,000
Cigars	24,000
Clothing	71,500
Confectionery	63,000
Electrical supplies	250,000
Flouring mills	342,000
Foundries and iron works	260,000
Leather goods	25,000
Lime	150,000
Machinery	606,575
Meat products—	
Hides	46,500
Lard	17,200
Meat packed	10,500
Tallow	16,000
Olive oil	95,000
Pickles	162,000
Sewer pipe	28,000
Planing mills	184,000
Artificial stone	11,500
Granite	4,500
Marble	35,000
Sandstone	3,000
Sugar, beet	1,485,000
Tin and galvanized iron	117,000
Fertilizer	150,000
Miscellaneous	83,000
Feed, mill	262,800
Oil refinery	687,500
Ice	615,000
Total value	$6,836,175

Manufactured Output.

	Quantity.
Brick (thousand)	3,400
Cement (tons)	80,000
Cigars (thousand)	440
Flour (barrels)	60,000
Hides (pounds)	530,000
Lard (pounds)	119,000
Meat packed (pounds)	72,500
Tallow (barrels)	800
Olive oil (gallons)	42,000
Pickled olives (gallons)	180,000

SAN DIEGO COUNTY.

San Diego County occupies the southern part of the State, and has an area slightly larger than Massachusetts. The Pacific Ocean washes its shores for upward of 75 miles. The land rises gently from the ocean for a distance of about fifty miles to a chain of peaks forming the backbone of the county, descending again quite rapidly to the Colorado River Valley, the greater part of which is below sea level.

The arable portion of the western slope is divided into a series of irregular terraces or plateaus. The lower or coast terrace comprises a number of valleys with the intervening mesa. This large acreage is practically frostless. Next comes a series of higher valleys, Poway Valley, varying in elevation from 400 to 500 feet. The third terrace, the altitude of which ranges from 1,000 to 2,500 feet, comprises the foothill region, with numerous smaller intervening valleys, nooks and glens. Next comes the mountain region. The area of tillable land in these valleys and mesas is approximately 600,000 acres, a still larger area being suited to pasturage and grazing. The elevation of the mountain valleys varies from 2,500 to 4,500 feet. They are chiefly devoted to stock raising, but many of them are well adapted to the growing of small fruits and vegetables and to diversified farming.

The arable soil of the county may be classed under two heads; granitic and adobe; though there is often a mixture of both, resembling adobe.

The intermountain region, the hills and valleys between the plains of Imperial and the western slope of the county, is rich in minerals, and affords excellent pasturage for several thousand cattle. The mineral wealth of San Diego County, though known to be great, is largely undeveloped, and offers an excellent field for the prospector and capitalist. Lepidolite and amblygonite, containing lithia and other valuable products, exist in greater quantities than in any other known deposit in the world. San Diego is producing the finest tourmaline in the United States. The crystals are of exceptional hardness, possess exquisite delicacy of coloring, and when cut form gem-stones of great brilliancy. Kunzite, a new gem, not found in any other part of the world, was recently discovered at Pala, and is attracting a great deal of attention. Gem experts are manifesting a deep interest in the remarkable crystallizations found in San Diego County.

According to a bulletin on the "Climatology of California," recently published by the U. S. Department of Agriculture, San Diego County has the heaviest and most reliable rainfall of any part of southern California. The rainfall increases, and greater extremes of temperature occur, as you leave the coast, the higher mountain peaks being often covered with snow to quite a depth during a part of the winter.

Water is impounded mainly for the citrus orchards of the coast section, the higher valleys requiring but little or no irrigation for their crops of cereals, deciduous fruits, olives, vegetables, etc.

As an evidence that education keeps pace with the population, there are more than one hundred and fifty schoolhouses distributed through the county, the instruction in which is up to the usual high standard found throughout California.

The board of supervisors has done and is doing good work in the way of road building, the most distant and mountainous places being readily reached over excellent highways.

The orange, lemon, and pomelo, or grape fruit, do well. The largest single lemon grove contains about 800 acres.

Raisin grapes are a profitable crop, and the industry has a bright future. The wine industry is large and growing.

Olive growers are making money. An olive grove, to be a commercial success, should be set out with a view to supplying pickling fruit, oil olives being treated as a by-product. The demand for pickled ripe olives is already in excess of the supply, and steadily growing.

Peaches, apricots, pears, quinces, plums, cherries, and other deciduous fruits do well. The mountain region around Julian has attained a special reputation for the crisp, finely flavored apples.

A good walnut orchard, properly located with reference to soil and water, is a safe investment. Small areas well suited to this crop may be found in different parts of the county—notably in the Tia Juana Valley. Almonds do well, and there are some thriving orchards.

San Diego County is celebrated for its deliciously perfumed and fine-flavored honey, which always finds a ready market at top prices. The apiaries are located for the most part among the hills and valleys back from the coast.

There is reason to believe that the cultivation of the silkworm may hold a most important part in the industrial development of San Diego County—the climatic conditions are so perfectly adapted to the delicate constitution of the worm, and the foliage of the mulberry may be had in such wholesome condition practically during the entire year. Many acres have been set out to mulberry trees, and those interested feel greatly encouraged over the outlook.

The dairy industry has shown a healthy growth, having trebled in the past four years.

The modern city of San Diego was founded by A. E. Horton in 1867. The situation is not only sanitary and attractive, but it is also admirably adapted for a large ocean commerce. Numerous wharves extend into deep water, and in their neighborhood may be found lumber yards, planing mills, warehouses, foundries, etc. The electric street railway system is equipped with modern cars and complete in every respect. Water is provided in abundance, the supply and distribution being controlled by the municipality. The streets of the city are well lighted by electricity. The schools, private and public, have an excellent reputation. A fine, large opera house, perfect in its appointments, is on the circuit of the very best theatrical and operatic companies. There are also several smaller theaters. The different religious organizations worship in attractive edifices; secret societies and benevolent associations have their lodge rooms, and numerous musical and literary clubs are supported by an active membership. There are several strong banking institutions. The hotel accommodations are excellent, and there are a number of sunny modern lodging houses. San Diego is thrown into special prominence as being the first port of call on the Pacific coast of the United States north of Panama, and the magnificent bay, around the shores of which the city is built, will soon become an important naval rendezvous. The Government has concluded arrangements for the erection of a large coaling station here, and is fast completing the

building of a modern military post at Fort Rosecrans, the big guns of which command the entrance to the bay.

Just across the bay from San Diego, ten minutes by ferry, is the peninsular city of Coronado, with its world-famous Hotel del Coronado and many beautiful homes.

National City, the second largest city, is situated on the southeast shore of the bay. The land here rises gently from the water front, and is admirably suited for the location of manufacturing establishments or other plants requiring a comparatively large area of level ground with good water frontage. There are a number of attractive homes within the city limits and nestling among the lemon and orange groves in the fertile valleys near by. The church and school facilities of the place are excellent. A large manufactory of citrus products is in successful operation, turning out citric acid, oil of lemon, lemon extracts, etc. There is also an olive oil factory, and its product is equal to the best.

Passing through Old Town, you come to Pacific Beach, a very attractive suburb of San Diego. The land is quite level near the ocean, affording one of the widest, smoothest, hardest, and most attractive beaches along the coast.

Escondido is some 35 miles northeast of San Diego, being connected by a spur with the main line of the Southern California Railway. A large area of productive country is tributary to Escondido, from which are made shipments of hay, grain, cattle, hogs, oranges, lemons, raisins, wine, honey, chickens, eggs, butter, etc. The school and church accommodations of the place are excellent.

STATISTICS OF SAN DIEGO COUNTY, 1909-10.

General Statistics.

Area 4,209 square miles, or 2,693,760 acres.	
Number of acres assessed	1,297,842
Value of country real estate	$5,681,556
Of improvements thereon	$987,774
Of city and town lots	$35,053,526
Of improvements thereon	$4,918,252
Of personal property	$5,358,624
Total value of all property	$51,999,732
Expended on roads, last fiscal year	$55,267
Expended for bridges, last fiscal year	$13,561
Number of miles of public roads	5,200
Road levy per $100, 1910	50c
Value of county buildings	$627,000
Irrigating ditches—miles, 133; cost	$3,420,000
Railroads, steam—miles, 205.14; assessed value	$2,224,044
Railroads, electric—miles, 56.1; assessed value	$168,330
Electric power plants — 4; assessed value	$58,900
Electric power lines—miles, 2; assessed value	$55,200
Number of acres irrigated	14,775

Cereal Products and Hay.

	Acres.	Bushels. (Tons of 2,000 pounds.)	Value.
Wheat	6,430	2,100	$63,000
Barley	30,750	15,750	291,375
Oats	7,500	1,200	32,400
Corn	2,200	1,104	27,600
Total cereals	46,880	20,154	$414,375
Alfalfa hay	1,720	7,500	$90,000
Grain hay	88,975	105,000	1,260,000
Grass hay	3,600	4,800	38,400
Total hay	94,295	117,300	$1,388,400

Dairy Industry.

	No.	Production.	Value.
Skimming stations	4	710,000	$248,500
Butter (pounds)		471,000	157,000
Cream (gallons)		10,000	10,000
Total value			$415,500

Dairies, 250; creameries, 3.

Poultry and Eggs.

	Dozen.	Value.
Chickens	29,540	$205,780
Ducks	1,500	9,750
Geese	500	9,000
Turkeys	1,200	32,400
Eggs	1,205,300	361,680
Total value		$618,610

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	65,860	25,850	91,710
Apricot	49,110	2,200	51,310
Cherry	5,745	725	6,470
Fig	15,700	2,100	17,800
Lemon	301,000	31,600	305,600
Olive	231,600	24,000	255,600
Orange	107,000	4,200	111,200
Peach	95,200	39,100	133,300
Pear	17,850	10,000	27,850
Plum	11,750	9,000	20,750
Prune	87,360	4,000	91,360
Pomelo	17,000	2,350	19,350
Total fruit	1,005,175	155,125	1,132,300
Almond	8,380	1,000	9,380
Walnut	7,000	2,700	9,700
Total nut	15,380	3,700	19,080
Grapevines	2,288,000	549,500	2,837,500
Berries, acres.	185	10	195

STATISTICS OF SAN DIEGO COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	2,500,000	$62,500
Apricots	1,600,000	48,000
Blackberries	300,000	12,000
Beans	3,340,000	116,900
Cabbage	500,000	5,000
Celery	20,000	300
Cauliflower	160,000	6,400
Corn	2,000,000	30,000
Cherries	200,000	10,000
Figs	16,000	480
Grapes	3,000,000	30,000
Grape fruit	600,000	9,000
Lemons (boxes)*	460,272	1,495,884
Loganberries	10,000	400
Onions	250,000	3,125
Oranges (boxes)†	52,088	32,857
Olives	3,700,000	157,250
Pears	103,250	3,097
Peaches	1,000,000	20,000
Peas	310,000	15,500
Persimmons	20,000	800
Plums	100,000	3,000
Irish potatoes	6,018,000	75,225
Sweet potatoes	300,000	4,500
Prunes	200,000	4,000
Quinces	2,000	60
Strawberries	2,000,000	80,000
Tomatoes	550,000	5,500
Rhubarb	18,000	540
Totals	29,329,610	$2,233,318

Dried—	Pounds.	Value.
Almonds	60,000	$7,800
Apricots	220,000	17,600
Beans‡	1,650,000	82,500
Onions	450,000	4,500
Peaches	30,000	1,500
Prunes	30,000	1,200
Raisins§	3,520,000	105,600
Walnuts	100,000	12,500
Totals	6,060,000	$233,200

Canned—	Gallons.	Value.
Olives	146,600	$131,940

Live Stock Industry.

	Number.	Value.
Cattle—Beef	12,000	$600,000
Stock	40,300	1,200,000
Dairy Cows—Graded	1,200	60,000
Thoroughbred—Angus	100	10,000
Ayrshire (common)	12,000	420,000
Devon	230	11,500
Herefords	15	750
Jersey	250	12,500
Calves	14,000	140,000
Swine	13,500	135,000
Horses—Thoroughbred	100	20,000
Standard-bred	2,000	250,000
Common	8,600	516,000
Colts	2,000	50,000
Jacks and jennies	40	3,200
Mules	1,400	189,000
Sheep	10,300	77,000
Lambs	4,200	12,600
Common goats	600	1,500
Total stock	122,835	$3,718,050
Wool (pounds)	100,000	25,000
Mohair (pounds)	125,000	12,500

* 1,472 cars.
† 168 cars.
‡ 55 cars.
§ 65 cars.

Manufactories.

	No.	Number of Employees.	Value of Products.
Boat builders	3	6	$7,000
Bookbinderies	3	15	15,000
Paper boxes	1	3	5,000
Wood boxes	1	6	20,000
Brick	3	75	100,000
Brooms	1	5	11,000
Blue prints	1	5	12,000
Carriages and wagons	2	13	10,000
Cigars and smoking tobacco	3	90	225,000
Cider and vinegar	1	4	5,000
Coffee, spices, etc.	2	20	190,000
Confectionery	6	55	200,000
Concrete piles	1	10	10,000
Chemicals	2	10	15,000
Electrical supplies	7	29	101,000
Flouring mills	1	16	218,750
Foundries and iron works	8	192	245,000
Furniture	1	6	23,000
Gas and electricity	1	20	100,000
Jewelry	5	23	62,000
Leather goods	2	9	8,500
Feathers	2	24	35,000
Jams and jellies	1	5	15,000
Curios	2	9	12,000
Engraving	1	7	12,000
Acetylene gas engine	2	3	10,000
Ice	2	23	32,500
Meat products—			
Hides	5	21	103,000
Lard	..	.....	8,600
Meat packed	..	15	40,000
Tallow	..	.....	33,000
Olive canneries	..	.....	130,900
Olive oil	4	40	27,000
Showcases	3	34	70,000
Pickles	1	4	4,500
Cement	1	22	40,000
Planing mills	7	171	573,000
Salt	2	70	140,000
Soap	1	17	9,000
Artificial stone	2	30	80,000
Crushed rock	3	63	225,000
Granite	3	24	40,000
Mattresses	2	21	65,000
Precious gems	8	20	50,000
Rough gems	5	20	200,000
Peanut butter and Saratoga chips	2	12	7,500
Trunks	2	7	30,000
Ranges	2	12	15,000
Auto tops	1	6	30,000
Tin and galvanized iron	5	50	110,000
Citrus washing powder	1	17	58,016
Sal soda	..	.....	1,825
Sawmills	1	100	500,000
Onyx	1	25	150,000
Rubber stamps	1	2	5,000
Fuel	1	12	20,000
Tents and awnings	2	15	50,000
Total value			$4,516,091

Manufactured Output.	Quantity.
Brick (thousand)	13,333
Brooms (dozen)	2,500
Cigars	3,770,000
Flour (barrels)	43,750
Hides (pounds)	640,000
Lard (pounds)	80,000
Meat packed (pounds)	350,000
Tallow (barrels)	1,600
Olive oil (gallons)	12,500
Olives (gallons)	146,600
Pickles (gallons)	2,000
Salt (tons)	12,000
Soap (pounds)	230,000
Smoking tobacco	10,000
Citrus washing powder	720,000
Sal soda	180,000
Lumber cut per day (feet)	65,000

STATISTICS OF SAN DIEGO COUNTY, 1909-10—Continued.

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	525,000	$175,000
Sweet wines	185,350	92,675
Beer (barrels)	52,324	418,592
Brandy	7,000	5,250
Vinegar	1,800	1,170
Totals	771,474	$692,687

Number of wineries, 5; number of distilleries, 4; number of breweries, 1.

Fish Industry.

	Pounds.	Value.
All kinds (fresh)	3,274,414	$163,720
Salt dried	1,056,000	42,240
Pickled	246,400	10,736
Lobsters	40,000	8,000
Turtles	11,000	550
Totals	4,627,814	$225,246

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	43,260	
Cedar (acres)	2,000	
Pine (acres)	17,200	$540,750
Oak (acres)	23,060	
Fir (acres)	1,000	
Fuel, wood (cords)	2,500	15,000
Eucalyptus	5,000	100,000
Total value		$655,750

Power used for mills and manufactories in county—Steam (number), 178; electrical (number), 350; gasoline (number), 100.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	55,000	$165,000
Beeswax	25,000	6,000
Flowers and plants	.....	75,000
Honey (strained and comb)	1,597,500	87,862
Mineral water (cases)	9,000	66,420

SAN FRANCISCO COUNTY.

San Francisco is essentially a commercial and manufacturing city. It produces no agricultural products, except to a small extent the minor vegetables. Its location on the bay of San Francisco, one of the finest and safest harbors in the world, eminently fits it for a commercial city, and its importance in this respect insures it a place among the chief shipping centers of the world.

Within the past two years the city has expended $12,000,000 for public improvements which include municipal buildings, streets, sewers, high pressure water system for fire protection, garbage incinerators, hospitals, etc. Its revenues are about $11,000,000 annually.

Area 42.19 square miles; value of city and town lots, $288,095,453; of improvements thereon, $145,167,790; of personal property, $81,763,921; total value of all property, $515,027,164; railroads, steam, assessed value, $392,925.

SAN JOAQUIN COUNTY.

San Joaquin County lies directly east of San Francisco and San Pablo bays and spans the great interior valley of California from the foothills of the Coast Range to the foothills of the Sierra Nevada Mountains. It thus commands the entrance to the chief port and metropolis of the coast from the continent, and for both water and land traffic; hence it is termed the "Gateway County." It embraces most of the famous San Joaquin delta within its limits. The soil varies in character, but the surface is mostly level and well adapted to intensive agriculture. The climate of this area is tempered by sea influences, by the air which rushes through the gap in the Coast Range. The products are wonderfully diversified, and from its rank, ten years ago, as the leading grain county in the West, it has progressed to a system of mixed and special agriculture and is now distinguished as a producer of hay, barley, potatoes, grapes, garden vegetables, orchard fruits, beans, onions, asparagus, celery, dairy products, and poultry.

The county has 400 lineal miles of navigable waterway, four transcontinental railroads, about 40 miles of interurban electric line, with other lines under construction, is improving 240 miles of permanent highways at a cost of $2,000,000. Its transportation facilities are consequently unexcelled. Stockton, its county seat, is a city of 25,000 people, a commercial and manufacturing center, and the distributing point for the San Joaquin Valley. Within the past ten years the number of farmers in the county has increased from less than 2,000 to over 5,500, and the number of farms under 100 acres each in extent has increased from 700 to 3,500; a striking evidence of the transition from the pastoral and grain raising conditions to intensified agriculture. San Joaquin County has $747,000 invested in county buildings which are models in their class. About $10,000,000 has been expended in the county during the past two years for railroads and other large enterprises. Agriculture and manufacturing are prosperous.

STATISTICS OF SAN JOAQUIN COUNTY, 1909-10.

General Statistics.

Area 1,365 square miles, or 873,600 acres.	
Number of farms	5,520
Number of acres assessed	870,400
Value of country real estate	$17,133,725
Of improvements thereon	$3,102,046
Of city and town lots	$7,735,615
Of improvements thereon	$7,438,553
Of personal property	$6,079,203
Total value of all property	$41,489,142
Expended on roads, last fiscal year	$458,130
Expended for bridges, last fiscal year	$125,246
Number of miles of public roads	1,200
Road levy per $100, 1910	37.3c
Value of county buildings	$747,000
Irrigating ditches (cost)	$1,750,000
Railroads, steam — miles, 238; assessed value	$5,103,869

General Statistics—Continued.

Railroads, electric — miles, 53; assessed value	$284,329
Electric power plants — 2; assessed value	$23,038
Electric power lines—miles, 77.75; assessed value	$51,077
Number of acres irrigated	275,000

Dairy Industry.

	Production.	Value.
Butter (pounds)	2,450,000	$637,000
Cheese		3,000
Milk sold and condensed		380,000
Total value		$1,020,000

Creameries, 2; skimming stations, 40; cheese factories, 2.

STATISTICS OF SAN JOAQUIN COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Value.
Apples	$9,500
Apricots	41,830
Asparagus	780,000
Blackberries	17,045
Beans	825,000
Beets	10,000
Cabbage	26,400
Celery	22,000
Cauliflower	15,500
Corn	18,200
Cherries	240,500
Figs	6,200
Gooseberries	500
Grapes	1,441,000
Lemons (boxes)	2,200
Loganberries	4,800
Nectarines	1,300
Onions	438,000
Oranges (boxes)	12,000
Olives	50,700
Pears	35,300
Peaches	235,100
Peas	29,500
Plums	19,200
Irish potatoes	2,145,000
Sweet potatoes	6,200
Prunes	81,900
Quinces	3,500
Raspberries	2,500
Strawberries	17,000
Tomatoes	30,000
Melons	75,000
Other vegetables	80,000

Dried—	Value.
Almonds	$152,000
Apricots	30,000
Figs	5,000
Peaches	71,000
Peanuts	4,500
Prunes	61,000
Walnuts	8,000
Total value	$331,500

Canned—	Cases.	Value.
Grapes	6,000	$18,000
Pears	900	3,600
Peaches	120,000	485,000
Plums	5,000	15,000
Tomatoes	10,000	16,000
Asparagus	.....	358,000
Total value		$895,600

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	14,250	1,000	75,220
Apricot	70,000	4,000	74,000
Cherry	39,300	10,200	49,500
Fig	8,100	400	8,500
Lemon	.....	.....	2,200
Nectarine	1,700	1,200	2,900
Olive	50,750	5,500	56,250
Orange	10,100	3,900	14,000
Peach	235,150	20,000	255,150
Pear	28,000	4,000	32,000
Plum	25,000	5,000	30,000
Prune	54,600	8,815	63,415
Quince	.....	.....	3,750
Total fruit	536,950	64,015	606,915
Almond	127,200	4,000	131,200
Chestnut	160	.....	160
Pecan	225	146	371
Walnut	8,500	19,000	27,500
Total nut	136,085	23,146	159,231
Grapevines, acres	25,040	13,750	38,790
Berries, acres	.....	.....	575

Live Stock Industry.

	Number.	Value.
Cattle—Beef	7,900	$197,500
Stock	25,840	568,040
Dairy Cows—Graded	14,180	567,200
Thoroughbred	200	20,000
Calves	7,120	56,960
Swine	45,200	361,600
Horses—		
Standard-bred	15,800	1,975,000
Common	6,200	465,000
Colts	3,500	105,000
Mules	5,800	707,600
Sheep	49,200	162,360
Lambs	4,600	4,600
Angora and common goats	350	700
Total value		$5,191,560
Wool (pounds)	170,000	30,000

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	900,000	$90,000
Sweet wines	4,650,000	930,000
Beer (barrels)	1,500,000	375,000
Brandy	100,000	40,000
Vinegar	.....	5,000
Grape syrup	15,000	18,750

Wineries, 110—6 large, 104 small; distilleries 6; breweries 2.

Manufactories.

	No.	Number of Employees.	Value of Products.
Art goods	3	16	
Bookbinderies and printers	6	151	
Canvas articles	2	151	
Brick	4	.....	
Brooms	1	305	
Carriages and wagons	8	4	
Cement	5	73	
Cigars	3	175	
Clothing	14	65	
Miscellaneous	14	185	
Confectionery	..	185	
Gas engines	5	29	
Crackers	..	210	
Electrical supplies	2	28	
Flouring mills	4	200	
Foundries and iron works	6	282	
Furniture	5	29	
Jewelry	5	18	
Leather goods	4	27	
Miscellaneous	4	29	
Machinery	9	402	
Miscellaneous	4	25	
Meat products	6	110	
Olive oil	6	55	
Pickled olives	2	8	
Miscellaneous	4	16	
Planing mills	11	210	
Salt	1	14	
Soap	1	10	
Artificial stone	3	64	
Granite and marble	2	9	$25,630
Tanneries	1	82	466,000
Tin and galvanized iron	2	12	14,500
Wire	2	31	38,400
Miscellaneous	3	36	50,800
Beverages	118	275	1,458,750
Creameries	4	43	640,000
Canneries	3	450	895,600
Totals	288	3,831	$1,234,130

STATISTICS OF SAN JOAQUIN COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres.	Bushels. (Tons of 2,000 pounds.)	Value.
Wheat	11,500	224,000	$189,980
Barley	243,600	4,384,800	2,395,482
Oats	34,560	1,036,800	518,400
Rye	7,500	86,250	77,625
Corn	2,600	.....	68,000
Total cereals	299,760	.....	$3,249,487
	Acres.	Tons.	Value.
Alfalfa hay	18,400	82,800	$579,600
Grain hay	140,000	210,000	1,680,000
Grass hay	.....	.....	21,000
Total hay	158,400	.....	$2,280,600

Forest Products.

	Amount.	Value.
Fuel, wood (cords)	12,000	$72,000

Power used for mills and manufactories in county—Steam (number), 24; electrical (number), 78; natural gas (number), 11; gasoline (number), 18.

Poultry and Eggs.

	Dozen.	Value.
Chickens	35,000	$210,000
Ducks	310	3,100
Geese	200	3,000
Turkeys	1,640	32,800
Eggs	3,200,000	800,000
Total value		$1,048,900

Fish Industry.

	Value.
All kinds	$35,000

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	495	$5,600
Beeswax	.....	160
Chicory (tons)	1,600	16,000
Flax (acres)	500	3,000
Flowers and plants (acres)	8	8,000
Hemp	400	7,500
Total value		$40,260

SAN MATEO COUNTY.

San Mateo County is that part of the San Francisco peninsula lying between San Francisco County on the north and Santa Clara and Santa Cruz counties on the south. This county is divided lengthwise by the Santa Morena ridge of mountains, forming the backbone of the peninsula. The mountain ridge is the fertile and picturesque watershed of a region peculiarly adapted for homes of beauty and comfort on its eastern slope. Along the bay shore are many miles of deep water, and spur tracks to this deep water are now under construction, thereby opening up vast possibilities to manufacturers who desire cheap sites with excellent shipping facilities. The Dumbarton bridge over San Francisco Bay has been completed within the year, and trains are now running from points in this State and the East directly to San Francisco without ferrying across San Francisco Bay.

On the west the descent to the Pacific is quick and abrupt into a region occupied by prosperous farmers, dairymen, stock raisers, and lumbermen. The whole ridge is everywhere accessible, full of springs, and all more or less covered with oak and redwood.

The United State census returns show that the increase in population from 1900 to 1910 was 119 per cent, there being but three counties in the State with a greater percentage of increase in population in the same period. Convenience of travel, climatic and scenic surroundings, educational advantages, shipping facilities, proximity to the metropolis of the Pacific coast are all favorable conditions working toward the prosperity of this county.

STATISTICS OF SAN MATEO COUNTY, 1909-10.

General Statistics.

Area 477 square miles, or 305,280 acres.	
Number of farms	563
Number of acres assessed	297,000
Value of country real estate	$10,875,500
Of improvements thereon	$4,454,310
Of city and town lots	$6,537,620
Of improvements thereon	$2,664,790
Of personal property	$2,200,800
Total value of all property	$26,733,020
Expended on roads, last fiscal year	$87,040
Expended for bridges, last fiscal year	$21,288
Number of miles of public roads	470
Road levy per $100, 1910	50c
Value of county buildings	$273,000
Railroads, steam — miles, 46; assessed value	$620,340

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	30,000	6,000	36,000
Apricot	3,000	.....	3,000
Olive	8,000	2,500	10,500
Orange	200	.....	200
Peach	850	.....	850
Pear	650	.....	650
Plum	150	.....	150
Prune	13,000	1,500	14,500
Total fruit	55,850	10,000	65,850
Almond	500	.....	500
Pecan	1,000	.....	1,000
Other nuts	1,500	.....	1,500
Grapevines	179,000	9,000	188,000
Berries, acres.	200	.....	200

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	315,000	$60,000
Apricots	10,000	5,000
Blackberries	1,500	120
Beans	300,000	17,000
Beets	250,000	1,200
Cabbage	18,000,000	180,000
Celery	170,000	13,500
Cauliflower	5,500,000	55,000
Corn	60,000	1,200
Onions	225,000	4,100
Pears	7,000	190
Peaches	3,700	150
Peas	200,000	12,000
Irish potatoes	4,000,000	40,000
Strawberries (chests)	230	1,840
Tomatoes	150,000	1,500
Artichokes	1,500,000	19,000
Totals	30,692,430	$401,800

Dried—	Pounds.
Beans	1,000,000
Onions	90,000
Prunes	225,000
Total	1,315,000

Dairy Industry.

	Production.	Value.
Skimming stations	502,700	$143,000
Butter (pounds)	717,200	107,000
Milk (gallons)	1,500,000	300,000
Cream (gallons)	10,000	6,000

Creameries, 2.

STATISTICS OF SAN MATEO COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Tons.	Value.
Wheat	1,064	453	$15,438
Barley	1,000	700	20,000
Oats	16,000	10,000	270,000
Corn	40	20	640
Total cereals	18,104	.....	$306,078
Grain hay	7,500	20,000	$245,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,200	$36,000
Stock	3,400	85,000
Dairy Cows—Graded	12,798	319,950
Thoroughbred—		
Jersey	300	12,000
Shorthorns	300	12,000
Calves	5,000	25,000
Swine	6,000	36,000
Horses—Common	2,500	125,000
Colts	250	5,000
Mules	50	3,000
Sheep	3,000	15,000
Lambs	500	1,000
Common goats	150	750
Total stock	35,448	$675,700
Wool (pounds)	12,000	2,400

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	25,000	$1,250,000
Redwood (acres)	25,000	1,250,000
Sawmills (number)	5	75,000
Fuel, wood (cords)	2,750	16,500
Lumber (feet)	15,000,000	300,000
Shingles (thousand)	7,000	14,000
Total value		$2,905,500

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	40,000	$8,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	6,000	$30,000
Ducks	150	675
Geese	50	600
Turkeys	80	1,120
Eggs	200,000	3,500
Total value		$35,895

Miscellaneous Products.

	Pounds.	Value.
Flowers and plants (acres)	500	$500,000
Onion seed	100,000	25,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	1	8	$6,000
Cigars	2	7	12,000
Foundries and iron works	2	270	2,000,000
Meat products	1	500	.....
Hides	..	.....	250,000
Lard	..	.....	450,000
Meat packed	..	.....	250,000
Tallow	..	.....	160,000
Olive oil	..	.....	200
Planing mills	13	120	3,000,000
Potteries	1	150	1,750,050
Salt	3	70	175,000
Tanneries	2	320	1,600,000
Fuse works	1	50	200,000
Paint works	1	200	.....

Manufactured Output.

	Quantity.
Brick (thousand)	2,500
Cigars (thousand)	50
Hides (pounds)	1,000,000
Lard (pounds)	6,000,000
Meat packed (pounds)	4,000,000
Tallow (barrels)	8,000
Olive oil (gallons)	200
Salt (tons)	4,000

SANTA BARBARA COUNTY.

Santa Barbara County is situated in the parallelogram formed by the trend in the California coast line made by Point Concepcion, the great continental headland. Its coast line is thus of considerable extent, being in fact about 100 miles in length. A chain of mountains, the Santa Ynez range, divides the county into two grand divisions. The southern division is the most populous, and contains Santa Barbara, the county seat, which has a population of about 12,000. The surrounding country is agricultural, being devoted to the culture of walnuts, olives, lemons, and beans in large quantities.

The northern part contains four large valleys. Lompoc Valley is a very prosperous and fertile agricultural section, Santa Ynez Valley is largely devoted to the raising of grain, as is the Los Alamos Valley. The Santa Maria Valley is the largest in southern California. Here is located the Union Sugar Company's factory at Betteravia. The hills on the southern side of this valley are the center of oil activity. Barley, beans, oats, and poultry form sources of large revenue to the inhabitants.

Santa Barbara has the best harbor in the county. There are large areas yet uncultivated, and the county is ripe for immigration. Movements to bring colonies here are under way. There is considerable activity in building, and Santa Barbara County is enjoying its full meed of prosperity.

STATISTICS OF SANTA BARBARA COUNTY, 1909-10.

General Statistics.

Area 2,630 square miles, or 1,810,665 acres.	
Number of farms	1,460
Number of acres assessed	1,067,162
Value of country real estate	$11,356,740
Of improvements thereon	$1,768,655
Of city and town lots	$4,483,475
Of improvements thereon	$4,321,505
Of personal property	$5,927,712
Total value of all property	$27,858,077
Expended on roads, last fiscal year	$156,642
Expended for bridges, last fiscal year	$81,049
Number of miles of public roads (estimated)	1,000
Road levy per $100, 1910	35c
Value of county buildings	$200,000
Railroads, steam—miles, 174.85; assessed value	$3,283,315
Railroads, electric — miles, 14; assessed value	$28,000
Electric power plants — 3; assessed value	$316,500

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	2,000	20,000	$15,000
Barley	35,000	1,155,000	475,000
Oats	10,000	360,000	135,000
Corn	1,015	40,000	15,000
Total cereals		1,575,000	$640,000

	Acres.	Tons.	Value.
Alfalfa hay	100	300	$4,000
Grain hay	35,500	45,000	500,000
Total hay	35,600	45,300	$504,000

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	20,500	1,500	22,000
Apricot	21,450	1,200	22,650
Cherry	700	.....	700
Fig	100	.....	100
Lemon	110,000	25,600	135,600
Nectarine	250	.....	250
Olive	25,600	8,750	34,350
Orange	700	250	950
Peach	6,325	1,300	7,625
Pear	1,250	300	1,550
Plum	100	50	150
Prune	1,250	200	1,450
Quince	100	.....	100
Other kinds	500	100	600
Total fruit	188,825	39,250	228,075
Almond	100	.....	100
Walnut	35,750	22,500	58,250
Total nut	35,850	22,500	58,350
Berries, acres			75

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	80,000	$15,000

Fish Industry.

	Pounds.	Value.
All kinds	1,900,000	$152,000

Dairy Industry.

	No.	Production.	Value.
Skimming stations	2	.....	$77,500
Butter (pounds)		400,000	128,000

Creameries, 2.

STATISTICS OF SANTA BARBARA COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	650,000	$7,000
Asparagus	40,000	2,800
Blackberries	75,000	2,700
Beets (tons)	85,000	1,500,000
Cherries	50,000	3,000
Figs	20,000	1,200
Grapes	100,000	1,000
Grape fruit (boxes)	500	500
Lemons (boxes)	60,000	150,000
Loganberries	100,000	3,000
Nectarines	20,000	500
Onions	4,500,000	45,000
Oranges (boxes)	800	1,500
Olives	600,000	16,500
Pears	400,000	9,000
Peaches	100,000	2,000
Peas	300,000	12,000
Persimmons	300,000	12,000
Irish potatoes	3,300,000	44,550
Sweet potatoes	40,000	1,000
Prunes	100,000	250
Raspberries	16,000	1,000
Strawberries	175,000	7,000
Rhubarb	2,000	500
Miscellaneous	100,000	5,000
Total value		$1,829,000

Dried—	Pounds.	Value.
Apricots	136,000	$12,240
Beans	35,000,000	1,295,000
Walnuts	1,940,000	280,500
Totals	37,076,000	$1,587,740

Poultry and Eggs.

	Dozen.	Value.
Chickens	9,000	$31,500
Ducks	100	500
Geese	25	150
Turkeys	50	600
Eggs	300,000	112,000
Total value		$144,750

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	1,000	$10,000
Flowers and plants (acres)	70	100,000
Honey	200,000	10,000
Sugar beets (tons)	85,000	1,500,000
Silk (raw)	8,000,000	6,500,000
Sweet peas	150,000	10,500

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,500	$75,000
Stock	25,705	850,000
Dairy Cows—Graded	7,600	300,000
Thoroughbred—		
Ayrshire	50	3,750
Holsteins	15	1,000
Jersey	300	10,000
Calves	2,650	25,000
Swine	7,200	40,000
Horses—		
Standard-bred	40	10,000
Common	6,350	625,000
Total stock	119,525	$2,241,750
Wool (pounds)	165,000	21,450

Forest Products.

	Amount.	Value.
Pine (acres)	2,500	.....
Paper pulp (pounds)	75,000,000	$600,000

Power used for mills and manufactories in county—Steam (number), 40; electrical (number), 5.

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	1	3	$3,000
Brick	3	12	13,600
Carriages and wagons	5	20	6,000
Cigars	2	5	8,000
Confectionery	5	14	55,000
Foundries and iron works	1	6	15,000
Leather goods	6	10	10,000
Lime	1	10	50,000
Meat products	10	60	
Hides	..	.....	18,900
Lard	..	.....	25,000
Meat packed	..	.....	5,000
Tallow	..	.....	7,500
Olive oil	1	20	19,250
Iron pipe	1	3	1,000
Planing mills	3	30	120,000
Artificial stone	1	5	6,500
Sugar, beet	1	900	1,500,000
Miscellaneous	5	30	50,000
Diamaceous earth	1	10	10,000

Manufactured Output.

	Quantity.
Brick (thousand)	1,700
Cigars (thousand)	100
Lime (barrels)	45,000
Hides (pounds)	200,000
Lard (pounds)	200,000
Meat packed (pounds)	50,000
Tallow (barrels)	750
Olive oil (gallons)	5,500

SANTA CLARA COUNTY.

Santa Clara County is situated on the south arm of San Francisco Bay, and is separated from the Pacific Ocean by one tier of counties. The county seat is San Jose, and is distant 50 miles from San Francisco. The county is 47 miles wide from north to south, and through the center runs the favored Santa Clara Valley, with an average width of 15 miles. The country from the valley slopes upward through rolling hills to the summit of the Mount Diablo range of mountains on the east and to the summit of the Santa Cruz Mountains on the west. Its peculiar location with reference to prevailing winds and ocean currents has a marked effect on the climate, rendering it pleasantly cool in summer and not too cold in winter. The average winter temperature is about 40° and in summer 70°. It is preëminently the horticultural county of California. The statistics accompanying this report shows the variety and quantity of its products.

Its roads are excellent, and make all points easily accessible. More than 300 miles of these roads are sprinkled during the summer months. Three lines of railroads connect it with the outside world. Its population is 70,000. San Jose, the county seat has a population of 30,000. Many flourishing towns and valleys are within its borders. Educational interests are represented by the Leland Stanford Junior University, the Santa Clara College, the University of the Pacific, The College of Notre Dame, and the State Normal School, together with numerous private seminaries and institutions for special educational work. In the public school system there are eight high schools and 104 grammar and primary schools. The annual expenditure for public schools is $311,500. This is in addition to the municipal expenditures by cities and towns for this purpose. The value of school property is $910,832.

The valley is drained by a number of streams. In summer their watercourses greatly diminish and the smaller ones wholly disappear. Having their sources in the surrounding hills and sinking as they approach the valley, they augment the subterranean supply of the artesian wells. These are all over the valley, usually from 60 to 100 feet in depth, though some find a larger and more permanent supply at a much greater depth.

The extent and value of agricultural, horticultural, and industrial interests can be gathered from the accompanying statistics.

STATISTICS OF SANTA CLARA COUNTY, 1909-10.

General Statistics.	
Area 1,355 square miles, or 867,200 acres.	
Number of farms	23,652
Number of acres assessed	727,906
Value of country real estate	$27,322,810
Of improvements thereon	$8,345,490
Of city and town lots	$17,394,550
Of improvements thereon	$11,501,980
Of personal property	$5,622,405
Total value of all property	$71,087,235
Expended on roads, last fiscal year	$220,935
Expended for bridges, last fiscal year	$20,225

General Statistics—Continued.	
Number of miles of public roads	1,011
Road levy per $100, 1910	40c
Value of county buildings	$954,300
Railroads—	
Steam, assessed value	$2,914,721
Electric, assessed value	$864,000
Electric power plants, assessed value	$315,730
Electric power lines, assessed value	$41,660
Telephone Lines — Miles wire, 1,529; poles, 7,950; assessed value	$161,530

STATISTICS OF SANTA CLARA COUNTY, 1909-10—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	1,000	27,500	$21,600
Barley	4,000	92,500	55,000
Oats	1,000	30,000	20,250
Total cereals	6,000	150,000	$96,850
	Acres.	Tons.	Value.
Alfalfa hay	1,500	7,500	$75,000
Grain hay	7,000	15,000	135,000
Grass hay	2,000	3,000	18,000
Total hay	10,500	25,500	$228,000

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	17,200	32,500	49,700
Apricot	544,000	11,300	555,300
Cherry	137,700	21,900	159,600
Fig	1,700	710	2,410
Lemon	2,600	320	2,920
Nectarine	1,000	520	1,520
Olive	10,800	4,500	15,300
Orange	1,250	705	1,955
Peach	592,500	40,300	632,800
Pear	126,200	15,550	141,750
Plum	271,000	20,700	291,700
Prune	5,257,900	416,000	5,673,900
Quince	2,600	320	2,920
Total fruit	6,966,450	565,325	7,531,775
Almond	18,100	4,750	32,850
Walnut	11,025	2,800	13,825
Total nut	29,125	7,550	36,675
Grapevines, (acres)	4,117	4,300	8,417

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	1,000,000	$250,000
Sweet wines	25,000	25,000
Champagne (bottles)	350,000	350,000
Beer (barrels)	95,000	725,000
Brandy	450,000	670,000
Alcohol	2,000,000	2,400,000
Total value		$4,420,000

Number of wineries, 50; number of distilleries, 11; number of breweries, 6.

Dairy Industry.

	No.	Production.	Value.
Creameries	13	.....	$285,000
Butter (pounds)		270,800	85,000
Cheese (pounds)		450,000	86,500
Total value			$456,500

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,500	$45,000
Stock	12,400	223,200
Dairy Cows—Graded	6,840	239,400
Thoroughbred—Angus	460	23,000
Calves	5,020	60,240
Swine	5,250	21,000
Horses—Thoroughbred	95	20,900
Standard-bred	260	39,000
Common	13,070	530,500
Colts	1,875	37,500
Jacks and jennies	44	440
Mules	250	12,500
Sheep	950	2,850
Lambs	450	1,350
Angora goats	155	775
Common goats	340	340
Total stock	48,959	$1,257,995

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	1,500,000	$80,000
Apricots	40,000,000	400,000
Asparagus	7,500,000	187,500
Blackberries	751,500	34,400
Beans	1,000,000	30,000
Beets	260,000	2,600
Cabbage	437,500	4,000
Celery	171,875	5,290
Cauliflower	117,000	4,400
Corn	1,812,500	37,500
Cherries	5,625,000	178,500
Figs	75,000	2,500
Grapes	2,376,000	23,760
Lemons (boxes)	1,620	1,620
Loganberries	275,000	5,500
Onions	132,000	3,960
Oranges (boxes)	1,800	1,800
Olives	600,000	20,000
Pears	9,500,000	300,000
Peaches	35,000,000	350,000
Peas	2,500,000	50,000
Irish potatoes	1,150,000	23,000
Prunes	80,000,000	1,600,000
Quinces	200,000	10,000
Raspberries	562,500	32,000
Strawberries	944,000	40,000
Tomatoes	30,000,000	150,000
Totals	222,493,295	$3,692,170
Dried—	Pounds.	Value.
Almonds	320,000	$48,000
Apricots	8,000,000	80,000
Beans	316,800	12,840
Onions	820,800	8,210
Pears	200,000	16,000
Peaches	7,000,000	350,000
Prunes	38,000,000	1,995,000
Walnuts	365,000	54,000
Totals	55,022,600	$2,564,050
Canned—	Cases.	Value.
Apples	7,500	$15,000
Apricots	67,500	168,750
Grapes	12,000	36,000
Pears	60,000	180,000
Peaches	50,000	150,000
Peas	100,000	300,000
Plums	8,000	20,000
Tomatoes	200,000	200,000
Totals	505,000	$1,069,750

Poultry and Eggs.

	Dozen.	Value.
Chickens	80,000	$258,000
Ducks	7,000	28,000
Geese	300	4,500
Turkeys	500	10,000
Eggs	1,000,000	250,000
Total value		$550,500

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	60,000	$550,000
Cedar (acres)	50,000	5,000,000
Redwood (acres)	10,000	300,000
Fuel, wood (cords)	35,000	160,000
Sash and door factories (number)	5	100,000
Total value		$1,610,000

Power used for mills and manufactories in county—Steam (number), 230; electrical (number), 120; water (number), 2.

STATISTICS OF SANTA CLARA COUNTY, 1909-10—Continued.

Miscellaneous Products.	Pounds.	Value.
Flowers and plants (acres)	150	$100,000
Garden seed	4,000,000	400,000
Sugar beets (tons)	12,000	120,000
Quicksilver (flasks)	2,500	102,000
Total value		$722,000

Manufactories.	No.	Number of Employees.	Value of Products.
Bookbinderies	2	56	$91,400
Wood boxes	3	25	70,000
Brick	5	105	100,000
Brooms	1	103	2,000
Carriages and wagons	11	.....	96,000
Cigars	13	50	60,000
Coffee, spices, etc.	2	25	150,000
Confectionery	28	70	140,000
Electrical supplies	7	22	75,000
Foundries and iron works	12	96	252,000
Furniture	5	15	20,000

Manufactories—Continued.	No.	Number of Employees.	Value of Products.
Jewelry	2	5	$7,000
Leather goods	15	40	100,000
Meat products—			
Slaughtered	..	.....	135,000
Hides	..	.....	86,000
Lard	..	.....	2,500
Tallow	..	.....	1,200
Olive oil	..	20,350	61,000
Pickled olives	..	40,000	20,000
Planing mills	14	625	250,000
Potteries	2	20	30,000
Soap	1	3	34,000
Artificial stone	6	35	100,000
Granite and marble	5	61	200,000
Tanneries	2	120	360,000
Tin and galvanized iron	7	70	135,000
Willow and wooden ware	1	1	1,800
Wood turning and carving	1	1	1,600
Miscellaneous	80	900	3,500,000
Total value			$6,141,500

SANTA CRUZ COUNTY.

Santa Cruz County fronts its entire length on the Pacific Ocean. It lies midway between Oregon and Lower California, and is in the heart of Central California. It is separated from San Mateo and Santa Clara counties by the Santa Cruz Mountains, and from Monterey County by the Pajaro River. It is one of the smallest counties, and comprises a narrow strip of mountainous land about 40 miles long and 18 miles broad, forming a vast amphitheater, and sloping from the summits of the Santa Cruz range, whose highest elevation, Loma Prieta, is 4,000 feet, southward and westward to the bay of Monterey.

The curving line of shore and the corresponding curve of the mountain line inclose an irregular, crescent-shaped tract of country, with an average width of 20 miles, which for grandeur, beauty, and variety of scenery equals any expanse of similar size in the world. The sides of the mountains are closely set with forests of pine, redwood, madrone, and other trees, the redwoods having, in many cases, attained gigantic growth.

A number of streams rise in these hills, and bring down the rich alluvial loam into the valleys, which, in their normal condition, teem with native grasses and flowers, and when cultivated yield phenomenal results. These streams are, agriculturally as well as topographically, an important feature, watering as they do every section of land. Besides these, natural springs are innumerable. Nearing the coast, there are many interesting topographical features. The leagues of wide, high, wind-swept grassy plateaus, which form remarkable grazing and dairy lands; the succession of chalk terraces; the broad amphitheatrical valley of the Pajaro; the salt lagunas, picturesque in configuration and surrounded by park-like groves of live oaks; the high sandstone cliffs along the shore; the magnificent ocean drives—all are materials for pleasant investigation.

Along the coast line, a series of raised benches forms a strip of elevated land. This widens to the south of the city of Santa Cruz, and affords a large area of fruitful soil, which has been brought into a high state of cultivation. From Santa Cruz City south the soil consists of light loam, abounding in lime, potash, and phosphoric acid.

In the Pajaro Valley there is a great variety from the rich sedimentary alluvial wash to the light, sandy soil of the foothills.

In the lower part of the valley a clayey loam predominates. This is followed by a heavy adobe higher up, and then the dark, reddish loam of the plains, the latter being the favorite with fruit growers, for it is here that flourish the best orchards.

The average annual rainfall, taken from a record of thirty-four consecutive years, is 25.26 inches, showing that this is a well watered district.

The charm of Santa Cruz is her infinite variety. In lumber products she ranks third in the State. Her butter, cheese and cream might well win her a place in the dairy districts. Hay, grain, potatoes, and the whole range of cereals and vegetables give enormous yields. In the

Department of Agriculture at Washington, D. C., there is a record of 130 bushels of wheat per acre raised in the Pajaro Valley, and while she does not claim to wear the "citrus belt," yet oranges are raised for home consumption, and the cultivation of the lemon is a profitable business; but her deciduous fruits, large and small, her table and wine grapes, and her fine wines, are winning renown. From the summit of the range, more than 2,000 feet above the sea, down to the wide and fruitful valleys along the coast, grow and flourish delicious fruits. Prunes, pears, apricots, peaches, cherries, Japanese and native plums, figs, walnuts, persimmons, olives, and nectarines thrive, but the crop of the largest profit is that of apples, their quality and size being astonishing and their yield as much so. From bellflowers in September to Newtown pippins in December the supply is steady.

The extent of the apple industry is shown by these statistics, and each years finds a large increase in the crop. During the harvesting of the crop in the Pajaro Valley, this industry gives employment to 2,391 males and 698 females, drawing a daily wage of $6,308.09 and a monthly pay roll of $198,242.70. The average number of boxes delivered to the packing houses per day totals 57,872 and a total weight of 2,314,880 pounds. Horses used in hauling these number 3,193.

The actual shipment of apples this season was 4,000 cars, shipments being made to Europe and other parts of the world. Independent of these shipments were apples used at the dryers, vinegar factories, canneries, and for home consumption.

This year during the month of October there was held in the city of Watsonville an "Apple Annual" or "show" given over entirely to the apple industry. As its name implies, it is intended to make this show an annual affair.

The fish hatchery at Brookdale and at Scott's Creek Station have produced during the past year silver salmon, steelhead, and rainbow eggs amounting to 2,509,000. There were shipped to the United States Bureau of Fisheries and State Commission 68,000 steelhead eggs.

Many acres have been set out in the last few months to eucalyptus trees, and many more are to be set out during the coming year.

Of the small fruits, the strawberry is the most widely grown and furnishes a practically continuous crop.

In the southern part of the county a large acreage is devoted to the profitable growth of sugar beets, potatoes, beans and onions, and the yield is enormous. Market gardening is profitable.

A great deal of asparagus and rhubarb are grown for outside markets.

Seeds, bulbs, plants, and cut flowers contribute largely to the supply for metropolitan markets.

Dairying is a profitable industry, and thousands of acres of grazing land support well-selected herds of stock.

Poultry raising is a profitable business, the climate and conditions being well adapted for such industry.

Considerable capital is invested in the deep sea fisheries. The fish hatchery at Brookdale, on Clear Lake, has upward of 2,000,000 trout and salmon fry.

During the fall and winter months 5,000,000 or 6,000,000 salmon eggs will be hatched and the fry liberated in the bay. Steelhead and rainbow trout abound in all the thirty odd streams.

The forest covered mountains are a retreat for quail and deer, and the many lagoons and the four beautiful lakes in the Pajaro Valley in fall and winter are feeding places for all varieties of wild ducks.

At Santa Cruz the tent city, pavilion, casino and baths, representing an expenditure of $750,000, were opened two years ago, and this beautiful summer resort had practically the greatest concourse of pleasure seekers on the coast. It is estimated 100,000 people from San Francisco and interior visited our shores during the summer.

Capitola, four miles east of Santa Cruz, can be reached by both steam and electric railroad. This is another beautiful summer resort.

There are two Carnegie libraries in the county well stocked with the latest works. The public schools throughout the county are of a high standard, as are also the private schools and colleges. The many fine churches represent the leading denominations. There are many fraternal societies, and a large number of them hold meetings in fine lodge rooms in buildings of their own. There are five banks in the county—all sound banking institutions.

The supervisors have done and are doing good work in road building, and the most mountainous places can now be reached by easy grades.

Many industries have developed to the profit producing point. The Santa Cruz Portland cement plant, located 12 miles north of the city of Santa Cruz, represents an expenditure of $5,000,000, and has the largest capacity for the manufacture of cement of any similar institution of its kind. The power works, tannery, paper mill, soap and glue factory, planing and sawmills, lime kilns and the bitumen industry, are all in active operation, and the general air of thrift and prosperity is apparent. The output of lumber has been large for a great many years, but great tracts of forest still remain. Many of the trees are of ancient growth, and it is not uncommon to see 35,000 feet of clear lumber cut from a single tree.

Santa Cruz, Watsonville, Boulder Creek, Soquel, Aptos, Ben Lomond, Brookdale, Felton, Capitola, Davenport, and Glenwood are the principal towns.

STATISTICS OF SANTA CRUZ COUNTY, 1909-10.

General Statistics.

Area 500 square miles, or 320,000 acres.	
Number of farms	1,765
Number of acres assessed	257,936
Value of country real estate	$4,856,460
Of improvements thereon	$1,715,565
Of city and town lots	$5,214,645
Of improvements thereon	$2,980,900
Of personal property	$1,976,425
Total value of all property	$16,743,995
Expended on roads, last fiscal year	$76,735
Expended for bridges, last fiscal year	$8,644
Number of miles of public roads	458
Road levy per $100, 1910	60c
Value of county buildings	$187,000
Railroads, steam—miles, 66.34; assessed value	$1,083,581
Railroads, electric — miles, 19; assessed value	42,940
Electric power plants — 2; assessed value	$63,275
Electric power lines—miles, 98; assesesd value	$24,560
Number of acres irrigated	950

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,148	$40,180
Stock	1,651	33,020
Dairy Cows—Graded	4,931	197,240
Thoroughbred—		
Guernsey	35	
Holsteins	175	
Jersey	62	
Calves	2,350	21,150
Swine	3,030	24,240
Horses—Thoroughbred	15	10,000
Standard-bred	143	28,600
Common	5,427	407,025
Colts	531	26,550
Imported Belgian draft stallion	1	
Mules	187	14,025
Sheep	1,419	5,676
Lambs	738	1,476
Angora goats	973	4,865
Total stock	22,816	$814,047
Wool (pounds)	2,840	511
Mohair (pounds)	1,100	264

STATISTICS OF SANTA CRUZ COUNTY, 1909-10—Continued.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	55	1,498	$1,348
Barley	496	17,210	10,325
Oats	2,434	85,795	34,442
Corn	1,080	30,434	27,390
Total cereals	4,065	134,937	$73,505
	Acres.	Tons.	Value.
Alfalfa hay	270	1,305	$14,355
Grain hay	9,139	15,253	152,530
Total hay	9.409	16,558	$166,885

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	700,948	71,462	772,410
Apricot	72,615	10,399	83,014
Cherry	22,320	3,221	25,541
Fig	297	170	467
Lemon	155	206	361
Olive	482	55	537
Orange	175	166	341
Peach	11,494	1,414	12,908
Pear	16,521	2,803	19,324
Plum	19,395	1,445	20,840
Prune	130,396	2,210	132,606
Quince	171	9	180
Other kinds	680	.....	680
Total fruit	975 649	93,560	1,069,209
Almond	184	76	260
Chestnut	147	90	237
Walnut	2,309	1,299	3,608
Total nut	2,640	1,465	4,105
Grapevines	871,450	151,350	1,022,800
Acres—			
Strawberries	247	.....	247
Raspberries	30	.....	30
Loganberries	102	.....	102
Blackberries	129	.....	129
Black mammoth	12	.....	12
Dewberries	2	.....	2
Total acres.	522	.....	522

Forest Products.

	Amount.	Value.
Sawmills (number)	4	.....
Grape stakes	193,000	$4,825
Fuel, wood (cords)	28,141	126,634
Laths (thousand)	2,250	7,875
Lumber (feet)	20,726,000	331,616
Pickets (pieces)	155,000	5,425
Piles	229	1,374
Posts (pieces)	252,630	30,315
Railroad ties (pieces)	23,810	14,586
Shakes (thousand)	1,280	21,760
Shingles (thousand)	20,482	35,843
Stave bolts (cords)	750	3,750
Miscellaneous	949	17,082
Total value		$594,085

Power used for mills and manufactories in county—Steam (number), 33; electrical (number), 14; water (number), 1.

Dairy Industry.

	Production.	Value.
Butter (pounds)	287,187	$89,028
Cheese (pounds)	260,400	35,154
Cream (gallons)	15,000	15,000

Creameries, 4; dairies, 28.

Fish Industry.

	Pounds.	Value.
All kinds	1,461,000	$43,830

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	123,106,125	$1,846,590
Apricots	211,760	4,235
Asparagus	9,000	540
Blackberries	584,650	20,462
Black Mammoth	51,000	1,785
Cabbage	79,650	4,780
Celery	104,880	5,244
Cauliflower	84,330	2,530
Corn	29,240	585
Cherries	756,490	37,824
Figs	23,360	1,168
Grapes	5,695,650	56,956
Lemons (boxes)	120	270
Loganberries	758,800	26,558
Pears	1,112,720	16,690
Peaches	1,083,170	27,079
Plums	504,385	20,175
Irish potatoes	9,144,700	114,309
Quinces	35,825	360
Raspberries	132,550	13,255
Strawberries	1,858,790	111,527
Tomatoes	132,900	1,329
Dewberries	5,050	505
Cucumbers (hothouse)	40,000	2,000
Totals	145,545,145	$2,316,756
Dried—	Pounds.	Value.
Almonds	1,080	$140
Apples	3,502,100	210,126
Apricots	787,350	47,241
Beans	472,544	16,539
Chestnuts	2,960	325
Onions	6,270	100
Peaches	2,000	100
Prunes	1,017,090	40,683
Walnuts	49,805	6,475
Totals	5,841,199	$321,729
Canned—	Cases.	Value.
Apples	16,000	$40,000
Jelly (dozen)	500	675
Preserves (dozen)	500	675
Totals	17,000	$41,350

Poultry and Eggs.

	Dozen.	Value.
Chickens	6,478	$38,868
Ducks	115	690
Geese	110	1,320
Turkeys	200	4,800
Eggs	719,195	215,758
Total value		$261,436

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	260,725	$52,145
Beer (barrels)	12,400	86,800
Brandy	1,000	500
Cider	21,532	6,459
Vinegar	1,206,505	180,966

Number of wineries, 26; number of distilleries, 1; number of breweries, 2.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	466	$932
Flowers and plants (acres)	34	34,000
Honey	10,900	2,180
Hops	70,000	10,500
Garden seed	12,000	1,200
Sugar beets (tons)	5,295	26,475
Bituminous rock (tons)	40,000	120,000
Pumpkins (tons)	1,067	4,801
Melons (tons)	691	10,365
Horse beans	31,500	630
Pelts (number)	7,620	2,667

STATISTICS OF SANTA CRUZ COUNTY, 1909-10—Continued.

Manufactories.

	No.	Number of Employees.	Value of Products.
Berry boxes and baskets	1	14	$12,000
Wood boxes	4	15	19,625
Carriages and wagons	3	6	6,250
Cement	1	500	2,850,000
Cigars	4	16	26,530
Confectionery	7	24	66,000
Cooper-shops	2	11	39,635
Foundries and iron works	1	2	4,000
Leather goods	5	8	17,200
Lime	2	173	437,500
Malt	..	.....	475
Meat products—			
Lard	6	30	10,920
Meat packed			10,625
Tallow			9,000
Cement drain pipe	1	2	3,000
Planing mills	8	71	177,950
Soap	2	4	6,636

Manufactories—Continued.

	No.	Number of Employees.	Value of Products.
Tanneries	1	35	240,000
Soda works	3	6	15,000
Powder works	1	120	900,000
Ice plant	1	5	8,000
Glue factory	1	2	675

Manufactured Output.

	Quantity.
Cement (tons)	285,000
Cigars (thousand)	442
Lime (barrels)	350,000
Malt (tons)	95
Hides (pounds)	165,900
Lard (pounds)	109,200
Meat packed (pounds)	85,000
Tallow (barrels)	600
Soap (pounds)	165,900
Powder (kegs)	600,000
Leather (sides)	40,000
Glue (pounds)	7,500

SHASTA COUNTY.

Shasta County lies at the head of the famous Sacramento Valley. One mile north of Redding, the county seat, the valley ends and the canyon, second only in fame to the valley, which bears the name of the greatest waterway in the State, begins. The area of the county covers 90 miles from east to west and 60 miles from north to south. Because of its unlimited mining, timber and water resources and the prolific nature of its soils, Shasta County offers unequaled opportunities for the man of small means as well as the capitalist.

Covering a portion of eastern Shasta are the Sierra Nevada Mountains and on the northeastern boundary is the Coast Range. These are lofty, some peaks exceeding 5,000 feet in height, and are very rugged. On the extreme eastern border of the county is Lassen Peak, raising its mighty head 10,577 feet above sea level. This mountain is timbered two thirds of the way up. Hot and boiling springs, and others noted for their medicinal qualities, abound in this region. In the central and southern portions of the county is a semi-circular region embracing over a half million acres of the grand Sacramento Valley proper, the altitude being from 500 feet to 2,500 feet above the sea. The southwestern portion of this section is a succession of rounded hills, varying in height from 50 to 200 feet, while the central and southern portions consist of table-lands, varying in altitude from 500 to 700 feet. Fertile valleys predominate.

Shasta is noted for the number and beauty of its streams. First in importance is the Sacramento River, which enters the county on its northern boundary, traversing it throughout to its southern borders. For 40 miles the magnificent stream meanders through fertile lands, after emerging from the picturesque and rocky canyon. The Sacramento is augmented by the combined McCloud, Pitt, and Fall rivers, the former finding its source at Mount Shasta, on the extreme north, enters the county and travels in a southerly direction, emptying into the Pitt, which earlier has received the Fall River flow, and continuing, still in a southerly course, meets and enters the Sacramento at a point a few miles north of Kennett. Most beautiful of all northern streams is Fall River, meandering for 40 miles through virgin pastures and delightful glades. Besides these main streams, there are numerous tributaries of importance entering the Sacramento on both sides, among them being Battle Creek, the seat of the largest power propositions in the northern counties, Clear Creek and Cottonwood Creek.

The soil of the valleys is an alluvium, a rich sedimentary deposit, largely intermixed with disintegrated rock, and in some parts with a gravel. The usual color is light red, or reddish brown. It is very fertile and excellent for plums, prunes, pears, figs, and small fruits. The mesa lands bordering the valleys are of a sandy loam, with a large percentage of clay, and carrying in many districts, especially in the higher parts, considerable gravel and boulders. Fruit does finely on these mesa lands. On the foothills in a red loam or clay, productive and adapted

for berries. The soil varies on the elevated plateaus of the north and northwest, from a black, sandy loam to a red loam or clay, while to the northwest the soil is generally adobe, productive of grain and rich natural grasses.

Irrigation is unnecessary for most crops, as the rainfall is sufficient. The rainy season begins in September and extends, at intervals of two or three weeks from that time, until May. During this time the ground is thoroughly saturated with moisture, and the rainy period covers the entire growing season. At the end of the wet season grains, grasses, and so forth are ready for the harvest, and fruits, grapes, etc., are beginning to ripen.

Beautiful resorts and health-giving springs abound. The mountains are heavily timbered with sugar pine, cedar, fir, and other valuable timbers. There are some large valleys and extensive plateaus, mostly devoted to general farming, stock raising and wool growing. The foothills are more or less timbered with oak and pine, and their higher portions yield all kinds of minerals and stones—gold, silver, copper, iron, quicksilver, platinum, lead, marble, sandstone, limestone, coal, onyx, etc.—affording also opportunities for lovely homes, to the small farmer, fruit grower, stock raiser, poultryman, and gardener. The climate is pleasant, not extremely hot in summer nor cold in winter. The valleys are capable of producing all things that grow in temperate or semi-tropical regions.

Shasta orchards are a success, and produce heavy crops of the best quality. The prune, peach, pear, plum, apple, apricot, almond, fig, lemon, orange, and olive thrive, while grapes of the wine, table, and raisin varieties have proven a success in the valley districts. Wheat, grasses, and alfalfa crops are prolific. There are good markets for everything produced, and home consumption is not nearly supplied, except in fruits. Grain, hay, butter, eggs, and vegetables are shipped into Shasta trade centers by the hundred car load during the year. Homeseekers will find the land adapted to fruit raising, grain growing, poultry farming, and gardening at lower prices than in the older settled portions of the State.

Stock raising is an important trade factor. Mild winters in lower altitudes obviate the necessity of feeding, while the summer ranges in the mountains make it possible for the stockraiser to keep his herds upon green feed, the greater portion of the year.

The sawmilling industry annually distributes hundreds of thousands of dollars for pay rolls and supplies. The Terry Lumber Company, which operates its mills in the Bella Vista and Anderson regions, makes its central shipping point on the main line at Anderson, its planing mills, yards, and dry houses being connected to the latter town by its own railroad. T. H. Benton also has immense timber reserves at Wengler, in the Big Bend of the Pitt, from where he ships six million feet of logs annually, to his mills and yards at Redding, using the Sacramento River as an economical carrier. There are other large mills in the Shingletown country, where traction engines do the freighting.

At Fall River and Cottonwood there are flour mills and creameries, and a large area of land in Anderson and Balls Ferry, is being prepared for a large number of families who are immigrating from Montana and other states for the purpose of farming ten and twenty acre tracts.

Throughout the Sacramento canyon are dotted numerous resorts, to which come tourists of all climes. They are easy of access, being for the most part on the main line of the Southern Pacific.

Redding, the county seat, is one of the most beautifully located cities on the Pacific Slope, commanding a superb view of both the Sierra and Coast ranges, and an equally peerless view of the Sacramento River, valley, and canyon—east, south, and north.

Anderson, twelve miles south of Redding, the fruit and lumber center of the county, and Kennett, seventeen miles to the north of the county seat, are the two next most important centers, but Coram, where the largest copper smelter in the State is located, and Delmar, the site of a big copper plant, are almost equally important.

Shasta's preëminence in mineral production, giving her the title of "banner county," is largely due to her immense copper output, but in other metals, especially gold and iron, her past records are quickly being beaten through active developments in her gold and iron mines. With the necessity for silicious ores for a flux, in the production of copper, immense activity is being shown in the gold territory west of Redding, and much capital is being interested in this direction as well as in the Old Diggings section.

Statistics showing the productions of the county are included herein, the figures being compiled from reports of the last preceding twelve months.

Copper production in the county has shown enormous strides since 1896, the year of the installation of the pioneer copper smelter in the county. In 1908, with only two smelters running, fairly full handed, the output of the red metal was 30,000,000 pounds; in 1909 it reached the total of 40,000,000 pounds, and in the current year, with the enforced reduction in output, owing to new installations and the low price of copper, the general average will be maintained, and by the end of 1911, with five plants in operation, an output will be attained of 100,000,000 pounds of copper. The gold output for 1909 exceeded $2,000,000.

In agriculture and horticulture Shasta County has great possibilities for extension, and large landowners are making experiments and tests with a view to obtaining the best returns on their investment. A great increase has been noticeable during the past twelve months in the product from truck gardens, and especially is this so with regard to tomatoes and cabbage, potatoes, cucumbers, cantaloupes, and watermelons. Berries show an increased acreage and larger output, while many orchardists are putting in acreages of cherries, olives, and apples—the latter principally in the famed Manton country, on the Shasta County side of Battle Creek. A new industry in the county is that of nurseries, and one enterprising florist has established himself in a substantial way in Redding. Two new butter factories in the eastern part of the county are thriving, and poultrymen are giving attention to this section.

Irrigation is receiving active attention, as most valuable lands lie within easy access to the numerous streams and watercourses that line the fertile valleys.

As an indication of the prosperity of the county it is noticeable that the tax rate has been reduced from $2.10 in 1909 to $1.87½ in 1910, with every prospect of a still further decrease to about $1.65 the next fiscal year.

STATISTICS OF SHASTA COUNTY, 1909-10.

General Statistics.

Area 4,050 square miles, or 2,590,000 acres.	
Number of farms	1,000
Number of acres assessed	1,523,450
Value of country real estate	$7,631,325
Of improvements thereon	$2,405,275
Of city and town lots	$681,450
Of improvements thereon	$1,250,775
Of personal property	$1,459,270
Total value of all property	$13,560,455
Expended on roads, last fiscal year	$52,689
Expended for bridges, last fiscal year	$57,771
Number of miles of public roads	1,020
Road levy per $100, 1910	40c
Value of county buildings	$175,000
Irrigating ditches — miles, 200; cost	17,500
Railroads, steam — miles, 133; assessed value	$2,634,596
Railroads, electric—assessed value	$15,000
Electric power plants—2 (four plants); assessed value	$370,699
Electric power lines—miles, 423; assessed value	$150,450
Number of acres irrigated	3,500
Toll roads (38 miles)	13,600

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	3,500	2,000	$70,000
Barley	10,000	7,000	245,000
Oats	1,350	750	23,250
Corn	100	50	2,000
Total cereals	14,950	9,800	$340,250
Alfalfa hay	9,000	.....	$108,000
Grain hay	4,000	.....	48,000
Grass hay	9,000	.....	54,000
Total hay	22,000	.....	$210,000

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	19,000	6,000	25,000
Apricot	700	.....	700
Cherry	1,000	500	1,500
Fig	1,000	200	1,200
Lemon	600	.....	600
Nectarine	100	.....	100
Olive	9,000	2,000	11,000
Orange	900	750	1,650
Peach	46,000	3,000	49,000
Pear	25,000	.....	25,000
Plum	1,500	.....	1,500
Prune	80,000	4,000	84,000
Quince	150	.....	150
Other kinds	10,000	.....	10,000
Total fruit	194,950	16,450	211,400
Almond	4,000	.....	4,000
Chestnut	100	.....	100
Walnut	350	100	450
Total nut	4,450	100	4,550
Grapevines	2,000	.....	2,000
Berries, acres.	300	.....	300

Wines, Brandies, Etc.

	Gallons.	Value.
Drv wines	20,000	$4,000

Number of wineries, 1; number of breweries, 1.

Fish Industry.

	Pounds.	Value.
Salmon	50,000	$5,000

Dairy Industry.

	Production.	Value.
Butter (pounds)	100,000	$30,000

Fruits, Vegetables, Etc.

	Total Production. Pounds.
Green—	
Apples	150,000
Apricots	30,000
Asparagus	9,000
Blackberries	35,000
Cabbage	75,000
Cherries	10,000
Grapes	70,000
Loganberries	12,500
Nectarines	5,000
Onions	25,000
Olives	111,000
Pears	950,000
Peaches	1,000,000
Plums	100,000
Irish potatoes	250,000
Sweet potatoes	25,000
Prunes	2,000,000
Quinces	40,000
Raspberries	8,000
Strawberries	30,000
Tomatoes	100,000
Hops	4,000
Total	5,039,500
Dried—	Pounds.
Almonds	22,000
Apples	40,000
Apricots	6,000
Beans	50,000
Figs	35,000
Grapes	5,000
Pears	100,000
Peaches	200,000
Prunes	300,000
Total	758,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	3,200	$80,000
Stock	10,000	150,000
Dairy Cows—Graded	500	20,000
Thoroughbred—		
Herefords	100	6,000
Holsteins	25	3,135
Jersey	400	20,000
Shorthorns	100	6,000
Calves	3,000	30,000
Swine	2,000	8,000
Horses—Thoroughbred	2	4,000
Standard-bred	7	7,000
Common	2,000	100,000
Colts	500	10,000
Jacks and jennies	75	525
Mules	100	7,000
Sheep	15,000	45,000
Lambs	12,000	12,000
Angora goats	400	2,000
Common goats	10,000	20,000
Cattle (yearlings)	2,000	20,000
Total stock	61,409	$550,660
Wool (pounds)	115,000	
Mohair (pounds)	10,000	

Poultry and Eggs.

	Dozen.	Value.
Chickens	700	$3,500
Ducks	100	800
Geese	50	500
Turkeys	650	19,500
Eggs	6,000	1,500
Total value		$25,800

Manufactured Output.

	Quantity.
Brick (thousand)	5,000
Cigars (thousand)	200
Flour (barrels)	3,500
Lime (barrels)	15,000
Hides (pounds)	250,000
Tallow (pounds)	55,000

STATISTICS OF SHASTA COUNTY, 1909-10—Continued.

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	350,000	.....
Sawmills (number)	7	.....
Charcoal (sacks)	25,000	.....
Fuel, wood (cords)	10,000	.....
Laths (thousand)	90	.....
Lumber (feet)	30,000,000	$450,000
Posts (pieces)	4,000	.....
Shakes (thousand)	1,000	8,000
Total value		$458,000

Power used for mills and manufactories in county—Steam (number), 9; electrical (number), 1.

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	3	50	$45,000
Cigars	3	6	10,000
Confectionery	3	4	8,500
Flouring mills	2	5	35,000
Foundries and iron works	2	45	125,000
Lime	2	75	25,000
Meat products—			
Hides	..	.....	25,000
Lard	..	.....	7,500
Tallow	..	.....	5,000
Pickles	..	.....	4,500
Pickled olives	..	.....	1,500
Planing mills	2	10	10,000
Marble	1	2	5,000

SIERRA COUNTY.

Sierra County has an area practically all mountainous. The altitude ranges from 2,000 to 8,600 feet, the highest elevation being that of the Sierra Buttes; but the greater portion has an elevation of from 4,000 to 5,000 feet.

The main ridge of the Sierra Nevadas crosses the eastern part from south to north. Several spurs traverse the county from east to west, forming the watersheds of the four principal streams which make the drainage system of the western part. These streams consist of the Middle Yuba River on the south, the North Yuba near the center, and Canyon Creek and Slate Creek on the north; and in the eastern end the many streams that form the headwaters of the Feather and Truckee rivers. Of the peculiar topographical features are the expansive valleys and lakes lying among the loftiest peaks of the Sierra. The lakes vary from one eighth of a mile to three or four miles in length, most of them circular, and, considering their small size, remarkable for their depth.

The important body of agricultural land is Sierra Valley. It extends over the boundary line into Plumas County, and is the largest and the most elevated of the valleys of the Sierra, being 4,750 feet above sea level. It is 30 miles in length and 10 in width. This valley is particularly adapted to stock raising and dairy purposes, and a fine quality of timothy and alfalfa hay is raised. There are several creameries in the valley, and a superior quality of butter is made, of which almost all is shipped to the outside. Considerable beef cattle are fattened for San Francisco and other markets, besides large shipments of sheep. The soil is a deep, black loam, largely admixed with rich vegetable mold, the result of ages of forest growth.

Since 1849 the principal industry has been gold mining. One hundred and ninety millions of dollars have been taken from its rivers, gravel deposits and quartz veins.

The greater portion is practically covered with a virgin belt of soft timber. The lumber cut runs into many millions of feet. The Floriston Paper Mill Company owns timber lands, and uses a large amount of Sierra County lumber.

Average temperature winter 47 degrees, summer 72 degrees, summer nights are pleasantly cool. Annual rainfall, about 60 inches.

Character of agricultural soil: black loam, very rich.

The principal towns are: Downieville, Forest City, Sierraville, Loyalton, Sierra City.

Natural products: white, yellow, and sugar pine, fir, spruce, and cedar, live stock, fruit, berries, and garden truck.

Manufactured products: lumber, boxes, sashes, doors, etc., creamery butter.

Minerals: gold, iron, copper, asbestos, and lime.

Irrigation and power facilities are unlimited.

Transportation facilities: The Boca and Loyalton Railroad, Central Pacific Railway, Western Pacific Railroad, Nevada-California-Oregon

Railway, and Hobart-Mills Railroad. Communication facilities: Sunset Telephone Company, Western Union Telegraph Company, and Sierra Valley Telegraph Company.

Educational facilities: first-class common grammar schools.

Health resorts: Campbell's Hot Springs, Webber, Independence, and Gold Lakes.

Hunting and fishing: trout, mountain quail, grouse, duck, snipe, deer, and bear.

STATISTICS OF SIERRA COUNTY, 1909-10.

General Statistics.

Area 957.4 square miles, or 612,736 acres.	
Number of farms	110
Number of acres assessed	351,520
Value of country real estate	$1,308,480
Of improvements thereon	$262,225
Of city and town lots	$63,405
Of improvements thereon	$275,925
Of personal property	$267,260
Total value of all property	$2,177,665
Expended on roads, last fiscal year	$7,874
Expended for bridges, last fiscal year	$12,146
Number of miles of public roads about)	300
Road levy per $100, 1910	50c
Value of county buildings	$14,000
Railroads, steam—miles, 29.48; assessed value	$250,282
Electric power plants — 4; assessed value	$5,750
Electric power lines—miles, 13½; assessed value	$2,000

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	345	4,182	$5,018
Barley	556	2,383	2,402
Oats	502	9,339	11,196
Rye	101	765	774
Total cereals	1,504	16,669	$19,390
	Acres.	Tons.	Value.
Alfalfa hay	1,024	1,529	$15,290
Grain hay	815	720	5,760
Grass hay	15,296	15,564	124,512
Total hay			$145,562

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	6,193	280	6,473
Cherry	242	40	282
Peach	356	35	391
Pear	441	16	457
Plum	441	16	457
Total fruit	7,673	387	8,060
Chestnut	38	10	48
Walnut	45	10	55
Total nut	83	20	103

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	370,000	$7,400
Cabbage	18,000	450
Cherries	9,350	460
Onions	8,000	200
Pears	11,000	330
Peaches	3,600	180
Plums	16,000	320
Irish potatoes	226,000	5,650
Strawberries	6,000	400
Totals	667,950	$15,390

Wines, Brandies, Etc.

	Gallons.	Value.
Beer (barrels)	206	$2,700

Number of breweries, 1.

Dairy Industry.

	Production.	Value.
Butter (pounds)	320,000	$100,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	3,390	$152,000
Stock	4,094	102,350
Dairy Cows—Graded	1,980	90,000
Thoroughbred—		
Herefords	75	4,500
Shorthorns	75	4,500
Calves	1,750	14,000
Swine	840	5,040
Horses—		
Standard-bred	5	2,500
Common	1,114	89,120
Colts	155	4,650
Mules	62	4,960
Sheep	2,800	9,800
Lambs	1,410	4,230
Angora goats	70	210
Total stock	17,920	$487,860
Wool (pounds)	21,000	3,360
Mohair (pounds)	80	12

Poultry and Eggs.

	Dozen.	Value.
Chickens	1,200	$6,000
Ducks	10	70
Geese	1	15
Turkeys	10	150
Eggs	12,000	3,600
Total value		$9,835

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	212,000	$650,000
Pine (acres)	212,000	.....
Sawmills (number)	16	160,000
Fuel, wood (cords)	23,000	47,500
Laths (thousand)	1,500	2,250
Lumber (feet)	50,100,000	720,000
Posts (pieces)	5,000	400
Railroad ties (pieces)	112,000	44,500
Shingles (thousand)	1,250	3,125
Total value		$1,627,775

Power used for mills and manufactories in county—Steam (number), 11; water (number), 5.

Miscellaneous Products.

	Pounds.	Value.
Honey	2,000	$200

Manufactories.

		Value.
Meat products—		
Hides (number)	1,255	6,275
Lard (pounds)	3,700	555
Tallow (pounds)	10,600	424

There are three planing mills, employing 100 men, output valued at $200,000.

SISKIYOU COUNTY.

Siskiyou is one of the northern counties of the State, adjoining Oregon for 80 miles on the north. Of its area of 6,048 square miles, 1,500 square miles is valley; the remainder is mountains and forest. Among the mountains are many farms and stock ranches, well watered and wooded. It contains large areas of farming, mining, desert, swamp, and timber lands. Much of the agricultural land is farmed without irrigation, producing good crops of wheat, oats, barley, rye, and in some localities alfalfa and timothy. The so-called desert lands were long considered of little value save for pasturage, but are now being successfully farmed and require only the application of water to produce abundant crops. The swamp lands when drained are exceedingly fertile. The Federal Government is at present engaged in a comprehensive plan of drainage and reclamation in the northeastern portion of this county, and southern Oregon, which contemplates the drainage of the swamp lands and the use of the water in the irrigation of the desert lands. This will make homes for thousands of settlers.

The mining section comprises the west half of the county, and produces nearly one million in gold annually. A system of immense ledges of copper ores have recently been discovered, which, when more fully developed, will add much to the mineral output. There are large deposits of iron ore, lime stone, granite, and marble of the finest quality, and sandstone, that owing to the absence of lime is regarded as the best on the coast. The only jade mine in California is in the western portion of this county,

The agricultural lands are chiefly comprised in Scott Valley in the western portion of the county, Shasta Valley and Little Shasta in the central portion, and McCloud and Butte valleys in the eastern portion. At the different elevations all fruit and vegetables common to the temperate zone thrive.

Timber is everywhere; there are thousands of sections that will cut from ten to twenty million feet of yellow and sugar pine, besides large quantities of red fir and cedar.

The Sierra Nevada and Coast Range mountains meet here. The altitude ranges from 2,000 feet in the valleys to 14,000 feet on the mountain peaks, the highest of these being Mount Shasta. There are localities where snow seldom falls, and regions of perpetual snow; these conditions make it one of the most scenic of the counties.

Many of the swift mountain streams and waterfalls have been harnessed for electrical power. Chief among these is the Siskiyou Electric Power and Light Company's plant at Fall Creek, which is the third largest in the State, and furnishes cheap and abundant power to all parts of the county. Electrical power sufficient to run the machinery of the entire State can be developed from the abundant water power.

The principal river is the Klamath, which with its tributaries drain almost the entire county. This stream is not navigable, and furnishes

a natural dumping ground for the placer mines, its swift current carrying the tailings out to the ocean.

The Southern Pacific Railroad passes through the county from north to south, entering near Coles at the base of the Siskiyou Mountains and leaving it near Dunsmuir, where are located its roundhouse and machine shops. The California Northeastern Railroad, at present a branch of the Southern Pacific, leaves the main line at Weed, and traverses the county in a northeasterly direction, passing through Butte Valley and then extending into eastern Oregon.

The scenic beauties and health-giving springs abounding in all portions of the county make this the mecca of the summer tourist and health seeker. The Marble Mountains, now but little known to tourists, will in time rival the Kings River Canyon, and the Yosemite Valley. Chief among the noted resorts are the famous Shasta Springs, Neys Springs, Shasta Retreat, and Upper Soda Springs, all situated in the Sacramento River Canyon. One hundred thousand gallons of the waters of these springs, and the Table Rock Mineral Springs are bottled annually. Sisson, at the base of Mount Shasta, where the largest fish hatchery in the world is located, Garretson's Springs in the Siskiyou Mountains, and the Klamath Hot Springs are noted health resorts. In all portions of the county fish and game abound, making it an ideal field for the sportsman.

Some of the largest pine lumber mills on the coast are located here, chief among which are the McCloud River and Weed Lumber Company plants. Vast areas of the timber lands after the removal of the timber make valuable farms.

Lumbering is the chief industry, with mining and live stock a close second and third. The mountain ranges furnish splendid range during the summer season for thousands of horses and cattle. New gold mines are being discovered, and old ones continue good with depth.

Yreka is the principal town, the courthouse, jail, hospital, and new hall of records are splendid buildings; two electric plants furnish light and power. The city owns its water system; water is obtained from the adjacent mountains, and being filtered through gravel beds is as pure as any in the State. All this added to our present prosperity, our temperate climate and natural advantages, assures for Siskiyou a bright future. Siskiyou is an inviting field for the homeseeker. By the last census returns there are but three inhabitants per square mile.

STATISTICS OF SISKIYOU COUNTY, 1909-10.

General Statistics.

Area 6,048 square miles, or 3,870,720 acres.	
Number of farms	1,000
Number of acres assessed	$1,894,302
Value of country real estate	$9,151,415
Of improvements thereon	$2,822,376
Of city and town lots	$459,235
Of improvements thereon	$999,140
Of personal property	$2,150,635
Total value of all property	$15,796,406
Expended on roads, last fiscal year	$65,426
Expended for bridges, last fiscal year	$6,367
Number of miles of public roads	1,150
Road levy per $100, 1910	40c
Value of county buildings	$1,500,000
Irrigating ditches (miles)	300
Railroads, steam (miles)	204
Electric power plants (number)	6
Electric power lines (miles)	163

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	3,200,000	$64,000
Beans	30,000	1,800
Beets	1,400,000	14,000
Cabbage	500,000	10,000
Celery	5,000	500
Cauliflower	10,000	200
Cherries	50,000	2,500
Onions	90,000	1,800
Pears	100,000	2,000
Peaches	200,000	4,000
Plums	400,000	8,000
Irish potatoes	2,000,000	40,000
Strawberries	12,000	1,200
Tomatoes	50,000	1,000
Total value		$151,000

STATISTICS OF SISKIYOU COUNTY, 1909-10—Continued.

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Bushels.	Value.
Wheat	100,000	2,000,000	.....
Barley	10,000	200,000	.....
Oats	14,000	560,000	.....
Rye	5,000	cut for hay	.....
Corn	700	.....	.....

	Acres.	Tons.	Value.
Alfalfa hay	35,000	105,000	$840,000
Grain hay	12,000	24,000	240,000
Grass hay	15,000	35,000	280,000
Total hay	62,000	164,000	$1,360,000

Number of Fruit Trees and Vines.

	Bearing.
Apple	16,000
Apricot	550
Cherry	875
Nectarine	100
Peaches	5,000
Pear	2,500
Plum	3,500
Prune	2,000
Total fruit	30,425
Almond	50
Walnut	500
Other nuts	550
Grapevines (acres)	25
Berries (acres)	100

Wines, Brandies, Etc.

	Gallons.	Value.
Natural mineral water	1,000,000	$125,000

Dairy Industry.

	Production.	Value.
Butter (pounds)	680,000	$242,000
Cheese (pounds)	40,000	$6,000

Live Stock Industry.

	Number.	Value.
Cattle—Beef	8,000	$320,000
Stock	36,000	720,000
Dairy Cows—Graded	4,500	180,000
Calves	13,000	195,000
Swine	8,000	120,000
Horses—Thoroughbred	16	32,000
Common	4,000	400,000
Colts	1,500	45,000
Jacks and jennies	20	20,000
Mules	900	135,000
Sheep	18,000	72,000
Common goats	600	1,800
Total value	.....	$2,240,800
Wool (pounds)	100,000	20,000
Mohair (pounds)	2,400	400

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	2,000,000	$4,000,000
Sawmills (number)	52	
Lumber (feet)	220,050,000	4,400,000

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	5,000	$25,000
Honey	125,000	12,500

Manufactories.

	No.	Number of Employees.	Value of Products.
Wood boxes	6	.....	$1,000,000
Flouring mills	3	.....	60,000
Jewelry	6	.....	.....
Leather goods	10	.....	.....
Lime	4	.....	.....
Malt	3	.....	.....

Manufactured Output.

	Quantity.
Cigars	200,000

SOLANO COUNTY.

Nestled in the foothills of the Coast Range on its western border, and extending across broad acres of the most fertile land in bounteous California till its eastern confines are marked by the majestic Sacramento River, lies Solano County. It is, in part, in the Sacramento Valley, the great stream of northern California breaking through Solano's hills in the onward rush of ages toward the sea, and thousands of its acres being in the vast area that has been a world's granary for years, its products going to all lands. A quarter of a million acres, nearly half of Solano's area, is devoted to grain raising. The wheat grown here is the best milling wheat produced in the State. Thousands of cattle, horses, and sheep graze on the upland pastures and marsh lands, and great industrial establishments pay fortunes in wages annually, but the brightest gem in the diadem of resources and industries that marks the county's unquestioned leadership is the fruit produced in its sheltered valleys, a product that has made the county famous far and wide. The first deciduous fruit sold in the United States each year is grown in Solano County, where are several sequestered valleys, with gently rising slopes, sheltered by ranges of high hills that bar the egress of moisture-laden clouds in one season and shut out the hot, dry winds of another. Here the trees bloom in February and the fruit forms rapidly, ripening beneath the genial heat of the spring season, which is really early summer. In early April the shipments begin and continue until late fall. The soil is unexcelled, even in California, for productiveness, and the fruit raised on the limited area is sold for millions of dollars annually, returning fortunes to the orchardists of this favored section. Citrus fruits are marketed here a month ahead of the southern California products.

In the eastern section of the county, where the enterprise of man has wrested broad acres from overflow, is another fabulously rich section, the delta lands of the Sacramento River being noted for their productiveness. In addition, many large industrial establishments are located within the county, a great majority of the people being prosperous wage workers, whose yearly earnings, with the resources of the soil, the products of field, farm, and factory, make a store of wealth and prosperity that seems incredible, the income of the county from all sources exceeding the princely sum of twenty-two million dollars per year.

This favored section is of a limited area. From east to west its extreme length is 45 miles, while from north to south the county measures 35 miles. The surface of the county is 911 square miles, or 583,000 acres, of which 40,000 acres are water, included in the Sacramento River and Suisun and San Pablo bays. Besides its great natural resources, or rather because of them, Solano County ranks as one of the strongest counties in California, from a financial view-point. There is not a dollar of county debt, either bonded or floating. Three communities—Vallejo, Suisun, and Rio Vista—own their own water

systems and supply their inhabitants at rates at least fifty per cent lower than those paid in cities depending upon private capital for this essential necessity. The real property and improvements in the county are worth, at conservative valuation, $30,000,000, while the mortgages amount to the comparatively insignificant sum of $2,666,000, the major portion of which is represented in money invested in home building within the municipalities. The enormously rich agricultural and horticultural holdings are practically free of incumbrance.

The tax rate for county purposes is from $1.00 to $1.10 on the $100.00 outside incorporated cities and towns, and 40 cents less inside, where no levy is made for road purposes. The expenditures, while by no means extravagant, are liberal for school, road, and hospital expenses. The county salary roll, including township officers, is about $45,000 per year. The sum of $50,000 to $60,000 is annually spent on the roads, which are maintained in excellent condition throughout the year. Public schools cost over $130,000 per year, of which $37,500 is raised in the county tax. The sum of $17,500 is spent sprinkling the roads, and over $11,000 for the expense of the homeless, sick, and indigent.

As in other respects, Solano County is greatly favored in climate. The rainy months are from November to March, with desultory rains a month or six weeks earlier and later. The dry season is from six to eight months. Grain and hay are kept in the field till hauled for shipment. Snow and hail are practically unknown, and frosts rarely do any damage to even delicate plants. The average rainfall is 16 to 20 inches, though it is greater in the fruit growing sections. Intense cold is unknown, and at Mare Island Navy Yard and other industrial plants hundreds of men work in the open air the year round. In summer the heat is never oppressive, rarely going above 100 degrees Fahrenheit. The nights are cool, a breeze from the ocean coming each day at sunset, cooling the atmosphere, and greatly adding to the health and comfort of the people.

The population in 1900 was 24,193, and is now estimated at 30,000, of whom nearly one half live in Vallejo and Benicia, the industrial centers of the county. The county could easily support double its present population.

The land of Solano County varies in the purposes for which it is adapted, the following table having been compiled by E. N. Eager, when county surveyor, to show the area available for different modes of cultivation:

No. 1 fruit land	53,000 acres
No. 2 fruit or No. 1 grain land	240,000 acres
No. 2 grain or No. 1 pasture land	75,000 acres
Pasture land	45,000 acres
Mountainous grazing land	30,000 acres
Marsh or tule land	100,000 acres
Water	40,000 acres

STATISTICS OF SOLANO COUNTY, 1909-10.

General Statistics.

Area 911 square miles, or 583,040 acres.	
Number of farms	3,100
Number of acres assessed	519,686
Value of country real estate	$10,501,856
Of improvements thereon	$2,137,796
Of city and town lots	$2,217,346
Of improvements thereon	$3,332,989
Of personal property	$2,575,388
Total value of all property	$20,932,310
Expended on roads, last fiscal year	$84,252
Expended for bridges, last fiscal year	$8,349
Number of miles of public roads	686
Road levy per $100, 1910	4.11c
Value of county buildings	$200,000
Railroads, steam—miles, 73.45; assessed value	$1,815,398
Railroads, electric—assessed value	$26,039
Electric power lines—assessed value	$140,025
Number of acres irrigated	2,000

Cereal Products and Hay.

	Acres.	Tons of 2,000 pounds. Tons.	Value.
Wheat	130,000	81,300	$2,340,000
Barley	35,000	30,000	600,000
Oats	6,000	3,000	75,000
Corn	300	.....	.....
Total cereals	191,300	114,300	$3,015,000
Alfalfa hay	1,835	14,680	$88,000
Grain hay	1,500	10,000	88,000
Total hay	16,835	24,680	$168,000

Wines, Brandies, Etc.

	Gallons.
Dry wines	345,000
Sweet wines	250,000
Champagne	20,600
Beer (barrels)	2,000
Vinegar	800

Number of wineries, 3; number of breweries, 3.

Fish Industry.

	Pounds.
Salmon	600,000

Dairy Industry.

	Production.
Butter (pounds)	4,176,530
Bottled milk (gallons)	720,000

Number of creameries, 6; number of bottling concerns, 1.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	2,600	$78
Apricots	1,148,662	46,594
Blackberries	3,000	300
Cherries	2,377,620	261,538
Figs	10,000	900
Grapes	.....	52,872
Nectarines	12,108	348
Pears	18,000,000	450,500
Peaches	4,391,333	108,783
Plums	3,269,280	129,328
Totals	31,433,603	$1,051,236

Dried—	Pounds.	Value.
Almonds	505,354	$53,133
Apricots	697,258	59,260
Beans	250,000	7,500
Cherries	1,683	58
Figs	163,989	4,896
Nectarines	20,277	1,388
Pears	3,023,055	153,521
Prunes	7,670,000	306,000
Walnuts	35,000	2,800
Apricot kernels	13,476	199
Totals	13,098,668	$633,755

Canned—	Cases.	Value.
Asparagus	40,000	$150,000
Fruits	25,700	61,100
Totals	65,000	$211,100

Live Stock Industry.

	Number.	Value.
Cattle—Beef	2,243	$67,300
Stock	2,546	76,235
Dairy Cows—Graded	6,518	140,195
Thoroughbred—		
Angus	540	7,000
Shorthorns	90	9,000
Calves	5,000	20,000
Swine	3,481	17,325
Horses—Thoroughbred	60	5,600
Standard-bred	130	9,800
Common	8,480	212,000
Colts	531	21,350
Jacks and jennies	55	4,150
Mules	1,592	119,380
Sheep	60,000	180,000
Lambs	15,000	22,500
Total stock	85,260	$822,635
Wool (pounds)	600,000	90,000

STANISLAUS COUNTY.

Stanislaus County lies in the northern end of the great San Joaquin Valley 114 miles from San Francisco, and 30 miles from tide water on the San Joaquin River. It is bounded by the Sierra Nevada Mountains on the east and the Coast Range Mountains on the west. The county is drained by three large rivers, the Stanislaus, the Tuolumne, and the San Joaquin rivers. The soil ranges from a light sandy loam in the southerly part to a heavy sandy loam in the central part. and adobe and red lands in the east. The climate is marked by long. dry, and only moderately hot summers, and short, mild winters, the average summer temperature being 72°. Ice rarely forms in the winter, and then only a thin skin. Lemon and orange trees flourish the year around without shelter.

As a health resort the county is not surpassed by any county in the State. Malaria is practically unknown, and we are not subject to any contagious or other dangerous diseases.

The county is crossed by four lines of railways, while the Sierra road connects Oakdale and vicinity with the mountain counties to the north. A short line of road connecting Modesto with the Santa Fe has been completed during the past year. A line connecting Modesto with tide water at Stockton is now in process of building, and other lines are projected.

The county contains four incorporated towns—Modesto, the county seat, in the central part, Newman in the west, Turlock in the south, and Oakdale in the north.

Education is provided for by many grammar schools and fine high schools.

The two irrigation districts are being rapidly cut up into small tracts and planted to alfalfa, fruit, and vines.

STATISTICS OF STANISLAUS COUNTY, 1909-10.

General Statistics.	
Area, 951,040 acres.	
Number of farms	4,000
Number of acres assessed	874,000
Value of country real estate	$13,481,695
Of improvements thereon	$1,406,175
Of city and town lots	$1,401,205
Of improvements thereon	$1,364,440
Of personal property	$2,909,270
Total value of all property	$21,184,005
Expended on roads, last fiscal year	$50,152
Expended for bridges, last fiscal year	$61,533
Number of miles of public roads	900
Value of county buildings	$80,000
Irrigating ditches — miles, 265; cost	$1,149,425
Railroads, steam—miles, 131.36; assessed value	$3,018,387
Electric power plants — 5; assessed value	$30,550
Electric power lines—miles, 87; assessed value	$88,370
Number of acres irrigated	97,925

Live Stock Industry.	Number.	Value.
Cattle—Beef	834	$7,720
Stock	11,461	137,675
Dairy Cows—Graded..	8,000	600,000
Thoroughbred—		
Dutch belted	20	2,000
Guernsey	10	1,000
Holsteins	100	10,000
Jersey	300	45,000
Polled Angus	9	900
Calves	7,189	58,025
Swine	8,000	80,000
Horses—		
Standard-bred	43	950,040
Common	8,253	379,075
Colts	1,843	48,435
Jacks and jennies	87	5,285
Mules	4,006	253,400
Sheep	27,454	68,895
Lambs	13,870	6,940
Angora goats	666	1,550
Total stock	92,145	$2,655,940
Wool (pounds)	300,000	52,000

STATISTICS OF STANISLAUS COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	944,000	$9,440
Apricots	1,810,000	22,625
Asparagus	1,200	600
Blackberries	40,000	4,000
Cabbage	40,000	800
Celery	5,000	500
Cauliflower	40,000	800
Cherries	54,000	4,320
Grapes	11,200,000	66,650
Grape fruit	300	80
Limes (boxes)	50	300
Lemons	25,000	2,500
Loganberries	20,000	1,600
Nectarines	6,000	60
Onions	200,000	2,000
Oranges	500,000	5,000
Olives	300,000	4,500
Pears	905,000	9,050
Peaches	2,082,000	20,800
Peas	80,000	3,200
Plums	805,500	10,055
Irish potatoes	300,000	3,000
Sweet potatoes	10,010,000	175,175
Prunes	1,438,000	28,760
Quinces	14,100	282
Raspberries	6,000	500
Strawberries	20,000	1,700
Tomatoes	20,000	200
Watermelons	18,545,000	370,900
Cantaloupes	1,800,000	180,000

Dried—	Pounds.	Value.
Almonds	146,320	.....
Apricots	728,000	.....
Beans	392,500	.....
Pears	5,000	$250
Peaches	800,000	.....
Peas	52,360	28,005
Raisins	270,000	16,200
Totals	2,134,180	$201,543

Canned—	Cases.	Value.
Apricots	5,888	$12,953
Peaches	30,569	67,242
Peas	30,000	54,000
Plums	162	356
Tomatoes	2,500	3,750
Peaches in gallon cans	3,242	5,855
Apricots in gallon cans	1,203	2,646
Totals	72,664	$146,802

Dairy Industry.

	Production.	Value.
Cream	52,140,880	$938,655
Butter (pounds)	2,535,519	903,144

Creameries, 4; cream stations, 12.

Poultry and Eggs.

	Dozen.	Value.
Chickens	30,872	$154,360
Ducks	150	600
Geese	50	200
Turkeys	300	10,800
Eggs	1,003,794	334,598
Total value		$500,758

Forest Products.

	Amount.	Value.
Fuel, wood (cords)	2,000	$8,000

Power used for mills and manufactories in county—Steam (number), 20; electrical (number), 12; water (number), 2.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	2,000	$2,000
Beeswax	18,000	270

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	82,500	1,856,250	$1,559,250
Barley	130,050	3,058,776	1,376,449
Oats	17,010	459,045	210,150
Rye	1,520	41,520	27,988
Egyptian corn	6,436	100,400	65,260
Total cereals	237,516	5,515,991	$3,239,097

	Acres.	Tons.	Value.
Alfalfa hay	71,169	259,614	$2,176,719
Grain hay	7,500	14,000	36,000
Grass hay	1,000	1,000	6,000
Total hay	79,669	264,614	$2,218,719

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	4,700	1,040	5,740
Apricot	9,050	31,000	40,050
Cherry	1,350	1,100	2,450
Fig	6,150	160,200	166,350
Lemon	2,330	3,210	5,540
Nectarine	60	125	185
Olive	5,330	10,750	16,080
Orange	10,780	15,320	26,100
Peach	50,410	398,510	448,920
Pear	3,620	6,480	10,100
Plum	5,370	7,820	13,190
Prune	7,190	7,180	14,370
Quince	94	65	159
Other kinds	20	35	55
Total fruit	105,454	942,835	1,049,289
Almond	8,960	62,050	71,010
Walnut	4,720	3,640	8,360
Total nut	13,680	65,690	79,370
Grapevines	1,050	8,450	9,500
Berries, acres	75	.....	75
Acres of cantaloupes			150
Watermelons			401
Garden truck			1,254
Trees			9,350
Peanuts			6
Tomatoes			40
Sorghum			30
Beets			7
Nursery			30
Miscellaneous			302

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	1	10	$60,000
Cigars	3	6	16,500
Confectionery	3	12	31,250
Flouring mills	1	12	82,500
Leather goods	8	20	47,595
Meat products—			
Hides	..	.....	42,372
Lard	..	.....	880
Tallow	..	.....	1,554
Olive oil	..	.....	3,000
Vinegar	1	.....	4,000
Ice	3	10	10,000
Mealfalfa	1	6	21,000
Grape juice	1	10	3,000

Manufactured Output.

	Quantity.
Brick	600,000
Cigars	300,000
Flour (barrels)	15,000
Hides (pounds)	470,800
Lard (pounds)	8,800
Tallow (pounds)	38,850
Olive oil (gallons)	1,000
Ice (tons)	1,000
Mealfalfa	1,500

SUTTER COUNTY.

Almost in the center of the far-famed valley of the Sacramento is located the county of Sutter, the larger portion of which lies between the Sacramento and Feather rivers directly at their confluence. The remaining portion of the county lies east of the Feather River, just south of Bear River. Surrounded by rivers on almost every side, it is evident that the soil of the county is largely river-made, the wash of a thousand years from the Sierra Nevada and Coast Range Mountains, and is deep and fertile, the equal of any in the whole State of California.

Although fruit and grain raising is the principal industry of the county, dairying is rapidly becoming an important industry and can be carried on successfully in almost any part of the county. There being one of the largest creameries in the State located at Meridian, that of the Western Consolidated Creamery Company, affords a market for the produce of the dairymen. There is also another creamery establishment located in Yuba City, which is doing a thriving business.

In the town of Yuba City, which is the county seat, with a population of 2,000, there are located one large packing house, two canneries, flour mill, and other smaller manufacturing concerns, which give employment to several hundred people during the harvest season.

The western portion of Sutter County in particular is being rapidly developed. The large land holdings are being cut up and sold out in small tracts to the Eastern homeseeker, upon which he can make a most profitable living. Meridian is a prosperous little town, located in the western portion of the county, as well as Live Oak, in the northern part, and Nicolaus in the southern division.

Transportation facilities about the county are of the best, there being the Western Pacific, Southern Pacific, Northern Electric railway companies, and river boats on the Sacramento River.

Sutter County is the home of the Thompson seedless grape, which is being grown so extensively in various valleys of the State. The largest vineyard of the Thompson variety in the world, which is owned by J. P. Onstott, is located but two miles west of Yuba City.

STATISTICS OF SUTTER COUNTY, 1909-10.

General Statistics.	
Area 601 square miles, or 384,079 acres.	
Number of farms	1,350
Number of acres assessed	380,000
Value of country real estate	$8,870,760
Of improvements thereon	$1,679,960
Of city and town lots	$413,300
Of improvements thereon	$1,046,700
Of personal property	$2,720,000
Total value of all property	$14,730,720
Expended on roads, last fiscal year	$22,368

General Statistics—Continued.	
Expended for bridges, last fiscal year	$3,983
Number of miles of public roads	756
Road levy per $100, 1910	40c
Value of county buildings	$40,000
Irrigating ditches — miles, 10; cost	12,500
Railroads, steam (miles)	53.12
Railroads, electric (miles)	30.10
Electric power lines—miles, 102.10; assessed value	$60,845
Number of acres irrigated	8,750

STATISTICS OF SUTTER COUNTY, 1909-10—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	4,372	3,988	8,360
Apricot	4,804	.....	4,804
Cherry	1,186	294	1,480
Fig	13,456	5,255	18,711
Lemon	754	.....	754
Olive	1,245	.....	1,245
Orange	1,110	.....	1,110
Peach	180,854	37,132	217,986
Pear	11,309	6,641	17,950
Plum	5,310	600	5,910
Prune	58,612	5,216	63,828
Total fruit..	283,012	59,126	342,138
Almond	68,895	26,669	95,564
Walnut	507	227	734
Total nut ..	69,402	26,896	96,298
Grapevines, acres	4,000	1,200	5,200
Berries, acres.	15	2	17

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	700,000	$14,000
Apricots	200,000	2,500
Asparagus	120,000	2,400
Blackberries	24,000	960
Cabbage	60,000	450
Cherries	74,000	3,700
Grapes	16,000,000	240,000
Olives	200,000	4,000
Pears	1,600,000	32,000
Peaches	10,500,000	105,000
Plums	300,000	3,750
Irish potatoes	2,265,000	19,385
Totals	32,043,000	$428,145

Dried—	Pounds.	Value.
Almonds	350,000	$38,500
Apricots	28,000	2,800
Beans	972,000	38,800
Figs	750,000	18,750
Pears	50,000	4,000
Peaches	1,828,000	74,491
Prunes	1,350,000	67,500
Raisins	14,200,000	710,000
Totals	19,528,000	$954,841

Canned—	Cases.	Value.
Peaches	75,000	225,000

Dairy Industry.

	Production.	Value.
Butter (pounds)	474,500	$142,350
Cheese (pounds)	480,000	76,800

Creameries, 2; skimming stations, 1.

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	21,596	431,920	$388,728
Barley	26,003	780,090	351,040
Oats	3,825	153,000	68,850
Corn	1,160	146,400	27,880
Total cereals..	52,584	1,511,410	$836,498
	Acres.	Tons.	Value.
Alfalfa hay	4,890	48,900	$342,300
Grain hay	6,185	9,278	92,780
Total hay	11,075	58,178	$435,080

Fish Industry.

	Pounds.	Value.
Salmon	40,000	$2,800
Pike	5,000	250
Striped bass	5,000	350
Totals	50,000	$3,400

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,250	$50,000
Stock	4,500	112,500
Dairy Cows—Graded..	4,064	162,560
Calves	2,899	34,788
Swine	6,043	72,516
Horses—Thoroughbred	7	700
Standard-bred	409	81,800
Common	2,515	201,200
Colts	1,276	89,320
Jacks and jennies....	43	6,450
Mules	1,950	273,000
Sheep	50,109	150,327
Lambs	9,294	18,588
Total stock	84,359	$1,260,049
Wool (pounds)	300,000	37,500

Poultry and Eggs.

	Dozen.	Value.
Chickens	13,008	$78,048
Turkeys	1,118	22,360
Eggs	.....	142,000
Total value		$242,408

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	395	$874
Hops	75,000	15,000
Alfalfa seed	150,000	24,000

Sutter county has one flour mill, that employs eight people, with an annual product worth $140,000.

TEHAMA COUNTY.

Tehama County occupies the upper or northern portion of the Sacramento Valley. It is 200 miles north of San Francisco and 120 miles north of Sacramento. Part of its eastern boundary follows the summit of the Sierra Nevada Mountains, and its western boundary lies along the summit of the Coast Range. Its greatest length is 78 miles; its width from north to south, 38 miles. Of its area, speaking roughly, 700,000 acres are agricultural lands, 800,000 grazing, and 500,000 timber.

Red Bluff is the county seat. It is a clean, modern little city, located upon an elevated plain, with superior drainage, and with the Sacramento River washing the foot of the bluffs on one side. Other towns are Corning, Tehama, Vina, Paskenta, and Kirkwood.

The county is easily reached, being on the line of the California and Oregon branch of the Southern Pacific Railroad. Two lines of this road converge at the town of Tehama, 12 miles below Red Bluff; one coming up the valley on the west side, and the other on the east side of the Sacramento River. North of Tehama there is but one line of track. The Sacramento River is navigable to Red Bluff, and steamboats from San Francisco and Sacramento make weekly trips up and down during most of the year.

Telegraph and telephone lines follow the railroad, and several private lines are in operation.

The public school system is complete and excellent. A school is maintained wherever there is need of one.

The Sacramento River runs through the county from north to south. From this river there is a rise to the east and west until the summit of the mountain range is reached. South of Red Bluff and west of the river lie broad plains; beyond these rolling hills developing into the foothills of the mountains, and then the mountains themselves, which rise quite abruptly to a height of from 3,000 to 9,000 feet.

In the alluvial land along the river the soil is mainly a dark brown, almost black, sandy loam, rich and deep. The table-land to the east is so rocky as to be of no use except for stock raising. On the west of the river the loamy lands merge into clayey loam second bottom; farther west is the sandier soil of the plains, gray, brown, and red in color; then the hills with reddish soil and gravelly loam. The creek bottoms have generally a yellowish soil. North of Red Bluff, in the hilly country, it is chiefly reddish clay and gravelly loam.

Tehama County is well watered. Numerous creeks carry streams from the mountain snows to the river. Wells can be dug anywhere to reach water at a moderate depth.

Experience has shown that plenty of water means an increase in product and variety. It is practiced to some extent, but mostly for the cultivation of alfalfa. There is a great deal of water available for irrigation and the development of electric power, awaiting only the capital and energy to make it return a large profit.

The principal industries are horticulture, agriculture, stock raising, and lumbering. There is practically no mining. A large deposit of chrome ore to the west, valuable sulphur springs to the east, some indifferent placer claims to the north, and the story of mining is told.

The fruit industry gives employment to a large number of people, who can engage in healthful outdoor work in summer. Several thousand persons are directly or indirectly engaged in some branch of the fruit business.

Olives are fast coming into favor as a crop and as a food. The tree grows rapidly and yields abundantly. The fruit brings a good price, and the demand is constant and growing. The fruit is picked green or ripe.

Oranges and lemons do well and bear abundantly. No attempts were made to plant them in quantity until within the past few years. There are in yards all over the county numberless trees that bear profusely. Several small orchards have been planted within the last few years, but they have not yet come into bearing. The trees are healthy and vigorous.

Almonds are being grown with success.

Raisin grapes, and indeed all grapes, grow remarkably well. The raisins can be cured in the sun during the long summer days.

An immense winery is located on the Stanford ranch, in the southern part of the county.

Peaches are the principal fruit. They are shipped green, and are canned and dried. The bulk of the crop is dried.

Prunes are readily cultivated and yield abundantly.

The apricot is the third fruit in importance. All the apricots are dried. The pits are sold for fuel, or for extracting the oil, which is used by druggists and confectioners.

Pears do well. The fruit is nearly all shipped green. The Bartlett is the favorite.

Figs are attracting more attention since the procurement of blastophaga, the insect which fertilizes the Smyrna fig. A great many of these trees are now being planted, and no doubt this fruit will assume a larger place in the output of the county hereafter.

Apples are grown only in the foothills. The chief apple-producing region of the county is at Manton, 35 miles to the northeast of Red Bluff, where very fine apples are raised.

Berries and all small fruits do well. They come into market early and sell readily.

In agriculture there has been a gradual change from the growing of wheat to fruit or other grains.

Hay is made from a mixture of wild oats and wheat grown together and cut when just on the point of turning. It is cured on the ground and then stacked.

Alfalfa, where water can be obtained, is the best of all forage crops. It is a splendid feed for cattle, hogs, and horses.

Experiments are being made looking toward the cultivation of hops and sugar beets.

The stock business is carried on under conditions that differ from those of the Eastern states, and are differing from those of former

years here. The owner of cattle, sheep, and goats finds it necessary to own or control two ranges; one in the valley for the winter months, and one in the mountains for the summer season. Considerable land has been withdrawn into temporary forest reserves. The number of men engaged in the stock business has greatly increased, and range land has been in greater demand as a consequence.

Sheep raising is easily the favorite branch of the stock business. This is the principal wool-producing county of northern California, and indeed of the State. Twice each year the buyers come here, and there is a busy time until the wool is sold. It is sometimes bought before the sheep are sheared. The favorite breeds of sheep are Spanish Merino, French, Merino, Southdown, and Cotswold for wool, and Shropshire more particularly for mutton.

The cattle business is conducted in much the same general way as the sheep business, except that the animals do not require constant care and herding; there is a further difference, that nearly every farmer has at least a few head of cattle, but few of them have any sheep. The favorite breeds of cattle are Holstein, Hereford, Jersey, and Durham.

Of late years Angora goats have come into greater favor. They are hardy animals, readily adapting themselves to a mountainous and hilly country which no other animal can occupy. They will eat almost anything; can protect themselves from wild animals, and their wool or mohair is in demand and brings a good price.

There is everywhere plenty of timber of various kinds for fuel, posts, etc., for immediate local use. Oaks are the principal trees of the valley, except along the streams, where willows, cottonwoods, and sycamores abound. Oak wood is the favorite fuel. But in the Sierra there is a magnificent belt of timber containing a great preponderance of sugar pine, which is one of the finest of timber trees. Several sawmills are located in this timber belt, and most of the land, if not all, is now owned by private individuals or corporations.

The wool, lumber, stock, fruit, hay, grain, etc., can all be sold at Red Bluff. A market is always available in San Francisco; and in Red Bluff, the county seat, there are local individuals and firms ready and willing to buy all of these products that are offered. There are large packing houses for fruit, warehouses for wool and grain, livery stables for hay, a flouring mill for wheat, and railroad and river means of transportation.

The large land holdings are being broken into smaller tracts to encourage immigration and settlement. The outlook is most hopeful.

STATISTICS OF TEHAMA COUNTY, 1909-10.

General Statistics.	
Area 3,200 square miles, or 2,048,000 acres.	
Number of acres assessed	1,344,294
Value of country real estate	$6,992,040
Of improvements thereon	$1,170,280
Of city and town lots	$592,800
Of improvements thereon	$1,142,855
Of personal property	$2,339,950
Total value of all property	$12,237,925
Expended on roads, last fiscal year	$40,710
Expended for bridges, last fiscal year	$38,924
Number of miles of public roads	837

Manufactories—Continued.	
Road levy per $100, 1910	288
Value of county buildings	$75,000
Irrigating ditches — miles, 355; cost	$86,000
Railroads, steam—miles, 57.83; assessed value	$1,778,044
Electric power lines—miles, 101; assessed value	$52,050
Telegraph lines—miles, 116; assessed value	$12,795
Telephone lines—miles, 115; assessed value	$10,930

STATISTICS OF TEHAMA COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	242,040	$3,630
Apricots	409,805	9,196
Asparagus	50,000	2,500
Blackberries	70,000	4,200
Beans, string	100,000	5,000
Beets	50,000	2,500
Cabbage	205,000	4,100
Celery	22,000	2,200
Cauliflower	35,000	2,450
Corn, sweet	400,000	6,000
Currants	6,000	600
Cherries	45,000	2,250
Assorted	1,215,000	32,000
Gooseberries	6,500	650
Grapes	15,050,000	301,000
Turnips	240,000	2,400
Melons	979,000	9,790
Lemons	15,000	750
Loganberries	10,000	500
Assorted vegetables	156,000	6,100
Onions	60,000	1,800
Oranges (boxes)	10,051	10,051
Olives, pickled	825,575	82,557
Pears	1,981,629	29,725
Peaches	3,948,254	59,223
Peas	85,000	5,100
Pumpkins	980,000	2,600
Plums	271,961	2,720
Irish potatoes	760,000	7,600
Sweet potatoes	240,000	2,400
Prunes	77,156	772
Peanuts	4,000	200
Raspberries	11,500	575
Strawberries	85,400	4,270
Tomatoes	1,400,000	25,000
Totals	30,046,871	$632,409

Dried—	Pounds.	Value.
Almonds	299,092	$67,286
Apples	3,000	300
Apricots	881,091	70,487
Beans	24,200	1,452
Figs	80,000	2,400
Onions	125,000	2,500
Pears	520,216	36,415
Peaches	4,955,655	247,783
Peanuts	4,000	200
Plums	26,896	807
Prunes	4,228,694	148,004
Raisins	12,504	1,250
Walnuts	27,488	2,749
Assorted	705,981	42,359
Totals	11,893,813	$623,992

Live Stock Industry.

	Number.	Value.
Cattle—Beef	77	$2,315
Stock	17,251	258,765
Dairy Cows—Graded.		
Thoroughbred	325	18,750
Common	1,463	36,585
Swine	5,111	25,555
Horses—American	2,348	139,015
Standard-bred	16	4,950
Common	1,745	56,830
Colts	860	31,370
Jacks and jennies	45	4,910
Mules	1,017	66,615
Sheep	222,272	555,680
Common goats	19,690	19,690
Thoroughbred bulls	34	1,700
Yearlings	80	1,725
Mule colts	339	11,050
Bucks	2,030	10,150
Total stock	274,703	$1,245,655
Wool (pounds)	1,878,152	281,723
Mohair (pounds)	61,637	12,327

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	18,650	3,750	22,400
Apricot	64,410	1,000	65,410
Cherry	5,070	245	5,315
Fig	13,125	2,535	15,660
Lemon	785	170	955
Olive	67,460	7,260	74,720
Orange	12,780	.....	12,780
Peach	679,400	203,750	883,150
Pear	63,050	3,750	66,800
Plum	6,000	.....	6,000
Prune	115,700	7,820	123,520
Total fruit	1,046,430	230,280	1,276,710
Almond	36,995	350	37,345
Walnut	3,000	.....	3,000
Total nut	39,995	350	40,345
Grapevines	2,775	.....	2,775
Berries, acres.	60	.....	60

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Tons.	Value.
Wheat	37,630	3,970	$119,100
Barley	43,860	7,438	163,636
Oats	4,975	817	24,510
Beans	110	13	1,560
Corn	250	200	5,000
Hops	175	170	34,000
Total cereals	87,000	12,608	$347,806
Alfalfa hay	5,850	10,288	$92,612
Grain hay	33,290	9,584	95,840
Timothy hay	.....	145	1,450
Total hay	39,140	20,017	$189,902

Wines, Brandies, Etc.

	Gallons.	Value.
Sweet wines	504,500	$252,250
Brandy	135,000	135,000

Number of wineries, 1; number of distilleries, 1.

Fish Industry.

	Pounds.	Value.
Salmon	258,266	$15,496

Dairy Industry.

	Production.	Value.
Butter (pounds)	132,000	$39,600
Gallons of milk	255,600	51,120
Gallons of cream	18,757	18,757

Number of creameries, 2.

Poultry and Eggs.

	Dozen.	Value.
Chickens, ducks, geese and turkeys	785,262	$179,408
Eggs	206,590	61,977
Total value		$241,485

Forest Products.

	Amount.	Value.
Sawmills (number)	2	.....
Fuel, wood (cords)	9,395	$56,370
Lumber (feet)	8,500,000	85,000
Posts (pieces)	12,190	1,828
Sash and door factories (number)	1	65,000
Shakes (thousand)	507	5,070
Planing mills	1	.....
Total value		$213,268

Power used for mills and manufactories in county—Steam (number), 3; electrical (number), 8.

STATISTICS OF TEHAMA COUNTY, 1909-10—Continued.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives) number 200	2,500	$200
Broomcorn seed	80,000	2,400
Flowers and plants (acres)	.....	10,000
Honey	.....	500
Hops	340,000	34,000
Syrup (gallons)	4,525	2,250
Mustard seed	19,540	977
Broom corn	40,000	2,000
Medicine	.....	3,000
Tamales	.....	4,000
Comp pins	.....	4,000
Ice	.....	15,000
Rugs	.....	4,000
Gas	.....	8,000
Ore	14,950	.....
Pits	199,689	2,000
Alfalfa meal	.....	54,000

Manufactories.

	Amount.	Value.
Brick	.....	$4,200
Cement blocks	.....	12,000
Cigars	.....	15,000
Confectionery	.....	23,100

Manufactories—Continued.

	Dozen.	Value.
Flouring mills	.....	80,000
Foundries and iron works	.....	12,000
Furniture and picture frames	.....	10,500
Leather goods	.....	7,500
Meat products—		
Hides (number)	146,057	$14,605
Lard	40,300	4,030
Meat packed	72,000	9,000
Tallow	19,290	950
Olive oil (gallons)	6,500	13,000
Pickled olives (gallons)	102,500	102,500
Salts, mine	.....	4,000
Syrups and extracts	.....	2,250
Scouring mills	.....	15,000

Manufactured Output.

	Quantity.
Brick (thousand)	600
Cigars	15,000
Hides (pounds)	146,057
Lard (pounds)	40,300
Meat packed (pounds)	72,000
Tallow (pounds)	19,290
Olive oil (gallons)	6,500

TRINITY COUNTY.

Trinity County is situated in the Coast Range of mountains and is drained by the Trinity, Mad, Eel, and Van Duzen rivers, and is well watered by the numerous creeks that carry streams of water from the mountain snows to the rivers and their tributaries. The higher mountain ranges being covered with snow during the winter season gives an ample supply for irrigation, and also provides an abundance of pasturage on the mountains. Trinity is bounded on the north by Siskiyou, on the east by Shasta and Tehama, on the south by Mendocino, and on the west by Humboldt County, thus being on the great mineral belt of the northwestern part of the State. Mining for gold has been the principal industry for fifty years. Hydraulic, placer, drift placer, dredge, and quartz mining have produced profitable results, and many hundreds of acres of auriferous gravel await exploitation, and also many quartz veins are as yet untouched. Many other valuable minerals have been found, but owing to the lack of cheap transportation facilities, none of them has been developed to any extent. With an abundance of sugar pine, yellow pine, and fir timber ready for the market the lumbering interests will be extensive as soon as railroad transportation is provided. Two proposed lines of railroad have been surveyed into the county with the object of reaching the timber belts, and also the immense deposits of copper ore known to exist. Indications have also been found of coal and oil. The state highway, now being constructed throughout the county, is attracting considerable attention to our different resources. The southern part of the county is particularly adapted for horticultural pursuits. Apples, pears, peaches, and grapes are now being grown there equal to any on the Pacific coast, and will develop into very profitable industries as soon as transportation facilities are provided. All kinds of fruits, berries, vegetables, grasses, hay, and grains, thrive and produce abundant crops.

Trinity can easily support four times the present population. With unlimited mineral wealth undeveloped, vast timber resources, good educational facilities in all parts of the county, with a high school at Weaverville, the county seat, and with wagon roads and telephone lines extending to nearly all parts of the county, Trinity is an inviting field for the prospector, tourist, investor, and homeseeker. Economic conditions are such that owing to the high prices of land in the more thickly settled portions of the State people must soon seek homes in our county where land is cheaper, and we have an ample supply of pure water, pure air, plenty of wood for fuel purposes, and a local market for many more products than we now raise. The climate of Trinity is temperate with a moderate snow fall on the higher mountains and sufficient rainfall in the lower portions to insure good crops and grazing. Many of the streams of Trinity have been stocked with different kinds of trout, and game is found in the different sections of the county. With many mineral and other springs, rugged and beautiful

scenery, and clear running streams of pure water, people from the heated valleys find Trinity an ideal camping place for a summer's outing.

STATISTICS OF TRINITY COUNTY, 1909-10.

General Statistics.

Area, 3,000 square miles, or 1,920,000 acres.	
Number of farms	327
Number of acres assessed	615,987
Value of country real estate	$2,228,976
Of improvements thereon	$246,341
Of city and town lots	$27,690
Of improvements thereon	$80,760
Of personal property	$317,714
Total value of all property	$2,884,258
Expended on roads, last fiscal year	$14,440
Expended for bridges, last fiscal year	$4,821
Number of miles of public roads	472
Number of miles of public trails	606
Road levy per $100, 1910	40c
Value of county buildings	$20,000
Irrigating ditches — miles, 215; cost	$21,500
Mining ditches—miles, 489; cost	$978,000
Electric power plants — 3; assessed value	$20,000
Electric power lines—miles, 32; assessed value	$6,350
Number of acres irrigated	9,320
Gold mining claims, 1,800; assessed value	$1,556,774
Quicksilver mining claims, 28; assessed value	$12,150
Copper mining claims, 18; assessed value	$1,175

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	476,900	$9,538
Apricots	2,000	60
Asparagus	1,500	60
Blackberries	32,000	1,500
Beans	20,000	1,100
Beets	50,000	1,250
Cabbage	115,000	2,350
Celery	1,500	60
Cauliflower	5,000	200
Corn	150,000	3,325
Currants	.....	75
Cherries	16,500	835
Figs	1,350	81
Gooseberries	.....	100
Grapes	107,000	2,140
Loganberries	.....	950
Nectarines	.....	75
Onions	86,700	1,734
Pears	75,000	1,550
Peaches	96,000	1,920
Peas	10,000	375
Plums	36,000	720
Irish potatoes	663,200	13,264
Sweet potatoes	2,700	81
Prunes	36,251	631
Quinces	.....	750
Raspberries	.....	2,500
Strawberries	.....	4,200
Tomatoes	.....	3,650
Total value		$55,074

Dried—	Pounds.	Value.
Almonds	.....	$150
Apples	8,000	640
Beans	43,750	875
Onions	30,000	750
Pears	3,500	210
Peaches	4,700	329
Plums	2,000	150
Prunes	1,600	80
Walnuts	.....	500
Total value		$3,684

Cereal Products and Hay.

Tons of 2,000 pounds.

	Acres.	Bushels.	Value.
Wheat	2,200	33,000	$41,250
Barley	120	3,400	4,250
Oats	200	3,000	3,000
Rye	50	1,000	1,000
Corn	400	8,000	12,000
Total cereals..	2,970	48,400	$61,500

	Acres.	Tons.	Value.
Alfalfa hay	3,000	15,000	$22,500
Grain hay	4,500	3,620	79,300
Grass hay	7,900	11,850	71,100
Total hay	15,400	32,470	$172,900

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	5,200	1,600	.....
Apricot	78	33	.....
Cherry	572	110	.....
Fig	39	24	.....
Lemon	15	10	.....
Nectarine	27	.....	.....
Olive	5	35	.....
Orange	7	52	.....
Peach	1,260	110	.....
Pear	780	146	.....
Plum	1,130	365	.....
Prune	610	85	.....
Quince	230	22	.....
Total fruit..	9,953	2,592	12,545
Almond	25	.....	25
Chestnut	45	.....	60
Pecan	5	.....	5
Walnut	210	.....	270
Other nuts	.....	.....	27
Total nut	285	.....	367
Acres of grapevines			35
Blackberries			30
Raspberries			25
Strawberries			110
Loganberries			10
Gooseberries			5
Currants			5

Dairy Industry.

	Production.	Value.
Butter (pounds)	85,000	$29,750

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,110	$29,750
Stock	15,000	225,000
Dairy Cows—Graded..	500	20,000
Thoroughbred—Angus	50	5,000
Calves	3,000	15,000
Swine	3,500	35,000
Horses—Thoroughbred	5	1,250
Standard-bred	200	10,000
Common	1,900	95,000
Colts	250	2,500
Jacks and jennies	20	480
Mules	250	12,500
Sheep	3,900	11,700
Lambs	1,600	1,600
Angora goats	300	900
Common goats	653	1,306
Total value		$556,986
Wool (pounds)	25,000	5,000
Mohair (pounds)	2,250	295

STATISTICS OF TRINITY COUNTY, 1909-10—Continued.

Wines, Brandies, Etc.

	Gallons.	Value.
Beer (barrels)	132	$792
Cider	2,500	1,250
Vinegar	6,000	1,550

Number of breweries, 1.

Poultry and Eggs.

	Dozen.	Value.
Chickens	1,600	$8,000
Ducks	50	400
Geese	15	150
Turkeys	500	5,000
Eggs	130,000	32,500
Total value		$46,050

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number)	65	$325

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	1,106,880	$11,068,800
Cedar (acres)	5,000	.....
Pine (acres)	440,000	.....
Redwood (acres)	701,180	.....
Sawmills (number)	20	30,000
Fuel, wood (cords)	25,000	125,000
Laths	.....	96,000
Lumber (feet)	5,000,000	.....
Pickets (pieces)	6,000	220
Posts (pieces)	1,600	160
Shakes	82,000	820
Mine lagging	76,000	1,960
Mine timbers (feet)	51,000	1,447
Total value		$1,362,487

Power used for mills and manufactories in county—Steam sawmills (number), 8; water sawmills (number), 12; steam quartz mills (number), 4; water quartz mills (number), 22; electrical quartz mills (number), 4.

VENTURA COUNTY.

Ventura County, one of the smallest of the group of seven southern counties, lies between Santa Barbara County on the north and west and Los Angeles County on the south and east, on the shores of the Santa Barbara Channel. The county is triangular in shape, one face of the triangle, full 50 miles, fronting the ocean.

Of its area of 1,852 square miles, less than one fourth is under cultivation. Back from the coast in all directions rise rugged mountain ranges, whose hearts are pierced in every direction with canyons and valleys of varying width. The entire northern section of the county is mountainous, but between the ranges here and there are to be found little valleys, whose soil is the most productive in the world.

The mountain watersheds supply innumerable streams which, flowing in different directions, form the two principal rivers of the county, from which is obtained a vast quantity of water for irrigation. These two rivers, the Santa Clara and the San Buenaventura, rise in these northern mountains, their sources being separated but a few miles. The Piru River, the Sespe, and the Santa Paula, each of considerable length from its winding through the mountain gorges and canyons, flow into and form the Santa Clara River, which enters the county on the southeastern border, and flows in a generally western direction straight across to the sea. This is a stretch of nearly 40 miles, and the stream, with its feeders north and south, becomes the life blood, as it were, of a magnificent valley covering the southern portion of the county from east to west. Beginning on the east with a width of 2 or 3 miles, the valley gradually widens until its western breadth along the seashore is about 20 miles. The valley is broken by detached mountain ridges, whose living streams not only aid in producing the inexhaustible water supply and enhance the fertility of the soil, but afford the finest scenery and most desirable health resorts.

The San Buenaventura River rises in the mountains in the northern part of the county, flows south, and enters the Pacific within 6 miles of the mouth of the Santa Clara.

The lower part of the Santa Clara Valley is a vast plain, 20 miles or more in width, extending back from the ocean in a great crescent, whose greatest distance is 10 miles from the shore. This plain for countless ages has been receiving the alluvial deposits brought down by the streams from the hills and mountains. It is the garden spot of the county, one of the most fertile tracts of land in the world, producing annually hundreds of thousands of dollars' worth of produce. Every variety of plant life does well in this section, but so well adapted is the soil to beans and beets that these are the staples.

Other products of the county—products in which it ranks with the leading counties in the State—are apricots, walnuts, lemons, and oranges, the yield of each of which is enormous. Not alone does the

county boast the largest lima bean ranches, but also the most extensive walnut grove, and the largest single lemon ranch.

Its mountain slopes are covered with verdure, and in its mountain valleys are many apiaries. In a good year a vast amount of honey is produced, netting big returns to the apiarist.

The narrow stretch of coast from southern Santa Barbara County, through Ventura County and including the northern portion of Los Angeles County, is the greatest lima bean section in the world, and Ventura County is the greatest bean-producing section in the world.

The sugar beet thrives in this great valley, and the percentage of sugar is greater here than in any other section in the world. The culture of sugar beets supports the Oxnard sugar factory, the second largest in the world, with a capacity of 2,000 tons a day.

Many herds of cattle and sheep are to be found in the mountain sections, and stock rising is an important industry.

The county was the pioneer oil producer in this State, and its production of petroleum is still large.

The mountains are rich in mineral wealth; among its productions may be mentioned asphalt, clay, gold, natural gas, petroleum, rubble, sandstone and borax. The output of oil for the year was 375,000 barrels, worth $225,000, and 12,000 tons of borax, worth $1,200,000.

STATISTICS OF VENTURA COUNTY, 1909-10.

General Statistics.

Area 1852.66 square miles, or 1,185,704.95 acres.	
Number of acres assessed	594,595
Value of country real estate	$15,665,190
Of improvements thereon	$1,230,910
Of city and town lots	$1,762,265
Of improvements thereon	$1,144,590
Of personal property	$2,991,716
Total value of all property	$22,794,671
Expended on roads, last fiscal year	$82,195
Expended for bridges, last fiscal year	$45,962
Number of miles of public roads	656
Road levy per $100, 1910	35c
Value of county buildings	$140,000
Irrigating ditches—miles, 59½; cost	$344,900
Railroads, steam—miles, 108.32; assessed value	$2,709,604
Electric power plants—1; assessed value	$10,000
Electric power lines—miles, 50; assessed value	$30,000
Number of acres irrigated	14,350

Cereal Products and Hay.

	Acres.	Tons.	Value.
Wheat	2,060	1,130	$33,900
Barley	14,500	6,525	143,550
Oats	1,600	380	9,360
Corn	1,850	720	18,000
Total cereals	20,010	8,755	$204,810
Alfalfa hay	.....	1,500	$16,500
Grain hay	.....	13,800	165,600
Total hay	.....	.....	$182,100

Dairy Industry.

	Production.	Value.
Butter (pounds)	72,880	$25,508

Creameries, 2.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	13,680	1,200	14,880
Apricot	82,000	4,200	86,200
Cherry	4,800	600	5,400
Fig	2,500	500	3,000
Lemon	180,000	60,500	240,500
Nectarine	1,600	250	1,850
Olive	32,060	3,000	35,060
Orange	240,000	11,500	251,500
Peach	6,800	900	7,700
Pear	4,800	800	5,600
Plum	2,000	400	2,400
Prune	11,000	250	11,250
Quince	1,000	100	1,100
Other kinds	7,000	7,000	14,000
Total fruit	589,240	90,200	679,440
Almond	12,000	2,000	14,000
Walnut	140,000	6,280	146,280
Total nut	156,000	8,280	164,280
Grapevines	112,000	18,000	130,000
Berries, acres	200	.....	370

Live Stock Industry.

	Number.	Value.
Cattle—Beef	15,000	$600,000
Stock	8,500	178,500
Dairy cows—Graded	1,200	36,000
Calves	3,450	20,700
Swine	4,800	14,400
Horses—Common	7,800	936,000
Colts	1,200	30,000
Jacks and jennies	15	15,000
Mules	1,800	180,000
Sheep	28,700	142,500
Lambs	14,350	50,225
Common goats	400	900
Total stock	.....	$2,204,225
Wool (pounds)	143,500	21,525

STATISTICS OF VENTURA COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	188,000	$1,880
Apricots	56,000	2,800
Asparagus	3,800	380
Blackberries	64,000	1,440
Beans	5,400	260
Beets	15,000	450
Cabbage	17,500	175
Celery	3,800	190
Cauliflower	6,000	300
Corn	56,000	2,800
Cherries	125,000	6,250
Figs	6,000	300
Grapes	145,000	8,700
Grape fruit	35,000	1,900
Lemons (boxes)	225,120	1,003,040
Loganberries	12,000	240
Nectarines	4,500	225
Onions	3,000	150
Oranges (boxes)	140,500	140,500
Olives	480,000	7,200
Pears	86,000	2,580
Peaches	92,000	2,760
Peas	7,500	375
Persimmons	4,000	240
Plums	9,500	475
Irish potatoes	840,000	16,800
Sweet potatoes	56,000	1,120
Prunes	5,400	216
Quinces	3,000	120
Raspberries	18,000	1,500
Strawberries	125,000	6,250
Tomatoes	80,000	800
Pomegranates	20,000	2,000
Rhubarb	20,000	200
Total		$1,214,616

Dried—	Pounds.	Value.
Almonds	84,000	$10,080
Apricots	5,180,000	530,950
Beans (small)	5,200,000	234,000
Onions	128,000	6,040
Peaches	1,000	100
Prunes	170,000	5,100
Walnuts	2,876,613	402,725
Lima beans	63,200,000	2,686,000
Total		$3,874,995

Fish Industry.

	Pounds.	Value.
All kinds	1,625,000	$48,750

Wines, Brandies, Etc.

	Gallons.	Value.
Dry wines	50,000	$15,000

Number of wineries, 7.

Poultry and Eggs.

	Dozen.	Value.
Chickens	5,400	$28,080
Turkeys	180	4,320
Eggs	184,000	46,000
Total value		$78,320

Forest Products.

Area of pine timber lands, 50,000 acres.
Sawmills, 1; value, $6,000.
Fuel, wood, 6,500 cords; value, $60,500.
Power used for mills and manufactories—Steam, 12; electrical, 18; water, 1.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives)—Number	11,470	$45,880
Flowers and plants (acres)	80	24,000
Honey	40,000	2,400
Garden seed	4,200	9,500
Sugar beets (tons)	187,000	981,750

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	1	2	$2,200
Brick	3	23	18,000
Confectionery	3	8	15,000
Foundries and iron works	2	38	70,000
Meat products—			
Hides	..	.....	30,000
Lard	..	.....	25,000
Meat packed	..	.....	4,500
Tallow	..	.....	800
Planing mills	4	30	35,000
Sugar, beet	1	650	2,000,000
Tiling	1	4	8,000

Manufactured Output.

	Quantity.
Brick (thousand)	1,200,000
Hides (pounds)	320,000
Lard (pounds)	175,000
Meat packed (pounds)	25,000
Tallow (barrels)	350

YOLO COUNTY.

Yolo County is situated in a delta of the Sacramento River where it changes from a southerly to a westerly course on its way to the Pacific. About 75 per cent of the county consists of level land, the balance being rolling hills and mountains. The principal pursuits of its inhabitants are farming, stock raising, and fruit growing.

In 1910 our barley crop alone exceeded $1,000,000 in value, while other cereals and hay reached a like amount. Our barley is largely of an export variety, and is shipped extensively to European centers, where it finds a ready sale and eager purchasers, who require a first class cereal for brewing and other purposes. Our other cereals are disposed of generally in local markets.

Our green fruits are shipped to Eastern markets, where they command top prices. Growers and shippers of these fruits have found this avenue of disposal a very remunerative one.

Our dried fruits and nuts occupy an envied position in the list of our products. They are shipped and marketed all over the world. They are of a superior quality and flavor.

Our live stock interests are second to none. Here are found some of the world's greatest sires and dams, which are purchased here to head stock farms all over the Western states, Mexico, and Canada.

Our dairy products bring in a revenue of $560,000 per annum. This money is distributed among dairymen semi-monthly, enabling them to do business upon a cash basis. This industry is becoming an important factor in our county, and indications point to an added increase to our output in the near future.

Our streams abound with fish of many kinds, which remunerate fishermen to the extent of $325,000 per annum.

Hops to the value of $140,000 are produced along our river bottoms. This industry is constantly growing in magnitude.

Eucalyptus trees have been planted upon 1,790 acres. These trees, of which 320 acres are two years old, show a marvelous growth and bid fair to add great value to our forest products. The former value of land where these trees are now planted has increased fivefold. This industry is in its infancy, but is receiving much attention, as an increased acreage will be planted in 1911.

The manufacture of farming machinery is becoming an item of added importance and necessity. It gives local purchasers an opportunity to purchase a manufactured product they desire at reasonable prices. These products are in great demand throughout the Western states. Their foreign sales, already of importance, are increasing yearly.

Boat building, to the extent of $75,000 in 1910, speaks well for our increasing freight and river traffic.

Yolo County boasts one of the best equipped flour mills in the State. Its output is shipped extensively and gives general satisfaction.

Yolo wines have a world-wide reputation. This industry could be profitably increased.

The poultry production for 1910 reached $355,600. This industry is growing yearly and is profitably followed by many.

Two hundred thousand dollars' worth of sugar beets were grown in our county in 1910. This industry is yet in its infancy, this being the third season only of its inception. When conditions are better understood by growers, this industry will become one of our principal productions.

Two railroads parallel our county north and south, while one crosses the southern part from east to west. An electric road is also in course of construction, which will also cross the southern part of the county and probably construct branch lines to other points.

We have a navigable water front of 90 miles along the Sacramento River, which affords at all seasons a cheap and ready means of transportation for the numerous products grown along its banks.

The reclamation of overflowed lands (which are very fertile) grow apace with our other developments. Many large tracts have either been reclaimed, or are in course of reclamation.

Irrigation is fast becoming a valued factor in our development. Every opportunity is offered for the development of water storage, which has been or is being taken advantage of at this time.

Our real estate is increasing in value at a rapid rate as Eastern and local purchasers continue to invest in small tracts, principally for homes. Real estate sales reached the sum of $500,000 in the past year; this sum does not include the purchase of rights of way purchased by railroads.

Our cities and towns: Woodland, a city of 4,500 population, is situated in about the center of the valley of which three fourths of our county is composed. This is our county seat. This city boasts of an ideal government, has eleven churches, four schools, one high school, which is accredited by the State University, four banks, which are considered absolutely safe, and a chamber of commerce composed of some of our best business men who are advertising our county truthfully, and who are successfully interesting many homeseekers in our numerous opportunities for good investments. This is a city of homes. Our next city of importance is Winters, situated in the southwest part of the county. Winters has a population of 1,500, has six churches, two grammar schools, one high school, and several packing houses, and a cannery. This is the principal shipping point of our fruit product.

Broderick is situated in the southeast part of the county and has a population of 1,500. Many of its inhabitants are employed in Sacramento, which is just across the river. At this town are now being constructed two railway bridges at an estimated cost of $1,250,000. One railway contemplates spending $1,000,000 more in the near future upon levees, buildings, etc. This town has one large school, several churches, and here is also located our principal boat building yards, also the principal fisheries of the county. This town promises to become a great railroad center as well as a manufacturing point, located, as it is, accessible to many railroads, as well as water transportation.

Our other towns are Blacks, Dunnigan, Knights Landing, Madison, Esparto, Capay, Rumsey, and Davisville, which last is a railroad junction, and where a vast amount of freight and express is handled. Here at Davisville upon 685 acres of very fertile land is located the State Agricultural College, which is affiliated with the State University

and which is presided over by competent professors, who instruct in various branches of agriculture, dairying, etc. This college is becoming very popular and its courses are being taken advantage of by many local, as well as scholars from various parts of the State.

In conclusion, our lands, in so far as fertility is concerned, are second to none, our climate is ideal, our rainfall sufficient, there never having been a failure of crops. The inducements to homeseekers are all that could be desired. Absolutely everything which appeals to prospective purchaser can be found here, where a close inspection is courted and where the most incredulous may be satisfied.

STATISTICS OF YOLO COUNTY, 1909-10.

General Statistics.

Area 1,017 square miles, or 650,880 acres.	
Number of farms	900
Number of acres assessed	613,609
Value of country real estate	$12,150,840
Of improvements thereon	$1,202,660
Of city and town lots	$868,620
Of improvements thereon	$1,485,260
Of personal property	$2,433,210
Total value of all property	$18,140,550
Expended on roads, last fiscal year	$60,690
Expended for bridges, last fiscal year	$20,290
Number of miles of public roads	687
Road levy per $100, 1910	40c
Value of county buildings	$57,000
Irrigating ditches — miles, 72; cost	$2,198,365
Number of acres irrigated	10,000
Telegraph and telephone lines.	2
Assessed value	$54,945

Cereal Products and Hay.

	Acres.	Bushels.	Value.
Wheat	14,500	239,700	$214,830
Barley	95,000	1,139,000	1,139,000
Oats	1,200	42,666	24,000
Rye	100	2,000	1,200
Corn	500	15,000	10,000
Total cereals	111,300	2,775,583	$1,389,550

Tons of 2,000 pounds.	Acres.	Tons.	Value.
Alfalfa hay	12,000	41,000	$500,000
Grain hay	10,900	10,900	109,000
Grass hay	2,000	2,000	6,000
Total hay	24,900	63,900	$605,000

Wines, Brandies, Etc.

Number of wineries	1
Number of distilleries	1
Number of breweries	1

	Gallons.	Value.
Sweet wines	156,973	$62,790
Beer (barrels) 3000	90,000	18,000
Brandy	20,500	22,000
Vinegar	35,000	3,500

Fish Industry.

	Pounds.	Value.
Salmon	1,600,000	$160,000
Other kinds	2,800,000	65,700
Totals	4,400,000	$225,700

Dairy Industry.

Creameries	2

	Production.	Value.
Butter (pounds)	1,511,590	$517,720
Cheese (pounds)	211,870	37,077
Ranch butter	27,000	6,750

Live Stock Industry.

	Number.	Value.
Cattle—Beef	1,124	$33,720
Stock	8,000	240,000
Thoroughbred—		
Ayrshire	18	1,440
Herefords	78	5,950
Holsteins	225	22,500
Jersey	187	9,525
Polled Angus	26	2,000
Shorthorns	250	25,000
Calves	2,500	20,000
Swine	8,126	81,260
Horses—Thoroughbred	189	14,175
Standard-bred	327	49,050
Common	5,978	291,000
Colts	2,250	33,000
Jacks and jennies	47	11,750
Mules	2,712	271,200
Sheep (common)	62,500	250,000
Lambs	12,004	36,012
Angora goats	3,125	12,500
Sheep (thoroughbred)	467	9,340
Hogs (thoroughbred)	692	16,660
Total stock	110,765	$1,416,082
Wool (pounds)	504,000	75,000
Mohair (pounds)	25,000	5,000

Note.—$100,000 may be added to this estimate for value of thoroughbred sires and dams.

	Dozen.	Value.
Chickens	31,000	$155,000
Ducks	1,500	7,500
Geese	120	1,080
Turkeys	2,310	67,750
Eggs	565,000	124,300
Total value		$355,630

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	1,790	$402,750
Fuel, wood (cords)	5,891	32,400
Total value		$435,150

Power used for mills and manufactories in county—Steam (number), 26; electrical (number), 11; Gasoline, 41.

The valuation on timber land includes land and estimated value of trees at two years of age.

Miscellaneous Products.

	Pounds.	Value.
Bees (hives)—No. 9150.		
Beeswax	18,000	$2,700
Broomcorn	8,000	320
Honey	550,000	27,500
Hops	1,154,440	138,532
Alfalfa seed	328,000	49,200
Clover seed (Bur.)	64,200	6,420
Garden seed	20,000	4,000
Sugar beets (tons)	40,000	200,000
Mustard seed	89,000	8,900

STATISTICS OF YOLO COUNTY, 1909-10—Continued.

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	30,000	$600
Apricots	3,038,000	91,140
Asparagus	91,000	7,500
Blackberries	11,000	1,160
Beans	127,000	10,140
Beets	120,000	2,400
Cabbage	977,000	9,770
Celery	195,000	3,900
Cauliflower	245,000	7,000
Corn	250,000	5,000
Currants	3,000	500
Cherries	6,000	360
Figs	21,100	620
Gooseberries	3,100	160
Grapes	1,812,600	59,815
Grape fruit	6,000	300
Lemons (boxes)	75	300
Loganberries	95,000	9,000
Nectarines	8,000	400
Onions	40,000	1,000
Oranges (boxes)	2,900	5,800
Olives	9,000	750
Pears	1,489,280	89,356
Peaches	2,563,200	38,448
Peas	18,000	900
Persimmons	4,000	80
Plums	1,163,280	34,898
Irish potatoes	800,000	8,000
Sweet potatoes	27,000	710
Prunes	900,000	13,500
Quinces	8,000	400
Raspberries	5,000	500
Strawberries	45,000	4,600
Tomatoes	2,000,000	20,000
Persimmons	37,000	500
Wine grapes	18,000,000	76,500
Totals	34,148,160	$605,636

Dried—	Pounds.	Value.
Almonds	1,475,500	$184,437
Apricots	3,442,250	292,591
Beans	4,000,000	175,000
Figs	155,000	6,200
Figs, 2d estimate	2,600,000	78,000
Nectarines	3,100	175
Onions	1,670,000	25,050
Pears	95,000	5,700
Peaches	4,002,500	200,125
Prunes	1,727,500	86,375
Raisins	3,500,000	122,500
Walnuts	41,000	4,920
Cantaloupes	.....	12,150
Melons	.....	1,240
Pecans	4,300	520
Apricot pits	1,100,000	11,000
Peach pits	120,000	600
Totals	23,931,850	$1,206,033

Canned—	Cases.	Value.
Apples	15,157	$37,892
Cherries	639	1,597
Peaches	31,487	78,717
Plums	796	1,990
Tomatoes	160	400
Totals	48,239	$120,596

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	850	100	900
Apricot	88,000	6,500	94,500
Cherry	4,000	.....	4,000
Fig	5,300	500	5,800
Lemon	1,200	1,000	2,200
Nectarine	300	.....	300

Number of Fruit Trees and Vines—Continued.

	Bearing.	Non-bearing.	Total.
Olive	23,000	3,000	26,000
Orange	13,000	1,000	14,000
Peach	71,000	22,000	93,000
Pear	42,000	1,000	43,000
Plum	53,500	750	54,250
Prune	180,000	500	180,500
Quince	500	100	600
Other kinds	1,975	100	2,085
Total fruit	484,575	36,550	521,135
Almond	144,500	29,000	173,500
Pecan	540	.....	540
Walnut	8,200	1,800	10,000
Other nuts	50	.....	50
Total nut	153,290	30,800	184,090

Number of grapevines	2,450,000
Number of berries, all kinds	160,000
Almonds planted season 1910	21,000
Peaches planted season 1910	16,000

Note.—Estimate on cereals covers only those which were stored or shipped; 15 per cent may be added to this estimate.

The numbers of trees are taken from assessor's books, and do not include those planted in the year of 1910.

Manufactories.

	No.	Number of Employees.	Value of Products.
Bookbinderies	2	2	$3,000
Carriages and wagons	9	18	37,500
Cigars	1	3	9,250
Clothing	12	17	45,000
Confectionery	4	8	53,000
Flour mills	1	15	173,000
Foundries and iron works	1	6	29,500
Furniture	4	9	13,225
Leather goods (harness)	6	11	30,175
Carriage trimming	2	3	3,900
Machinery (farm)	17	44	212,500
Sheep pelts	..	.....	2,080
Meat Products—			
Hides (green)	..	.....	8,000
Lard	6	10	23,000
Meat packed	5	7	6,000
Tallow	5	7	1,300
Olive oil	3	3	2,220
Pickles	2	2	2,000
Pickled olives	3	6	15,300
Planing mills	5	12	59,600
Artificial stone	3	15	60,000
Granite	2	2	3,000
Marble	2	2	3,000
Tin and galvanized iron	9	13	65,000
Tamales	4	6	11,050
Wood turning and carving	2	3	5,000
Miscellaneous	10	50	100,000
Boat building	2	17	75,000

Manufactured Output.

	Quantity.
Cigars (thousand)	185,000
Lime (barrels)	25,000
Hides (pounds, green)	80,000
Lard (pounds)	112,000
Meat packed (pounds)	60,000
Tallow (barrels)	100
Olive oil (gallons)	3,700
Sauerkraut (pounds), 12,000	$360

Dressed meats are shipped to the value of $51,000.

YUBA COUNTY.

Yuba County is about half valley and half mountains. In the mountainous portion the industries are mining, lumbering, and stock raising, but considerable fruit and hay are produced.

At Hammonton and Marigold, on the Yuba River, dredge mining is carried on extensively. The machines are in operation day and night. The Colgate power plant derives its energies from the waters of the Yuba River. It has the longest transmission line in the State. Many important quartz mines are operated. The Feather River forms most of the western boundary. This stream is the second largest watercourse in the Sacramento Valley, and is navigable as far up as Marysville. Bear River is the southern boundary of the county. The Yuba River passes through the county about midway. These rivers are never failing in water supply. Subterranean water is available in most parts of the county. There are two irrigation districts that take water from the Yuba River.

The county is traversed by two lines of the Southern Pacific, by the Western Pacific, and by the Northern Electric railroads. The California Midland Railroad has obtained rights of way and will be built.

The county has at Wheatland the largest hop fields in the world.

In the production of gold it ranks fourth among the counties of the State.

Marysville is well represented by manufacturing establishments. A woolen mill, a wool-scouring plant, a flour mill, a cannery, three foundries and machine shops, and other productive plants. Electric power is abundant, and shipping facilities are abundant and cheap. There is a ready market for all the manufactured product.

Land is very reasonable in price and very productive. Much of the desirable area of the county is practically undeveloped. The valley lands will successfully produce anything that can be grown from Maine to Florida.

STATISTICS OF YUBA COUNTY, 1909-10.

General Statistics.

Area 625 square miles, or 400,000 acres.	
Number of farms	910
Number of acres assessed	366,469
Value of country real estate	$2,459,720
Of improvements thereon	$498,040
Of city and town lots	$773,020
Of improvements thereon	$1,144,325
Of personal property	$1,550,560
Total value of all property	$6,425,665
Expended on roads, last fiscal year	$19,526
Expended for bridges, last fiscal year	$15,260
Number of miles of public roads	450
Road levy per $100, 1910	40c
Value of county buildings	$208,000
Irrigating ditches, cost	$160,550
Railroads—steam	$800,000
Electric	$67,500
Electric power plants; assessed value	$94,000
Electric power lines; assessed value	$108,000
Number of acres irrigated	6,500
Telegraph lines, 72 miles; assessed value	$5,400
Telephone lines, 3,000 miles; assessed value	$35,000

Cereal Products and Hay.

	Acres.	Tons.	Value.
Wheat	25,000	18,750	$532,500
Barley	6,500	3,250	58,500
Oats	9,000	4,500	94,500
Corn	25	300	9,500
Total cereals	40,525	26,800	$725,000
	Acres.	Tons.	Value.
Alfalfa hay	630	6,300	$50,400
Grain hay	9,550	72,325	73,950
Total hay	10,180	18,625	$124,350

Forest Products.

	Amount.	Value.
Area of timber lands (acres)	56,000	$560,000
Fuel, wood (cords)	4,000	20,000
Lumber (feet)	2,500,000	375,000
Posts (pieces)	25,000	2,500
Shakes (thousand)	1,000	8,000
Total value		$965,500

Power used for mills and manufactories in county—Steam (number), 5; electrical (number), 15.

STATISTICS OF YUBA COUNTY, 1909-10—Continued.

Number of Fruit Trees and Vines.

	Bearing.	Non-bearing.	Total.
Apple	7,250	850	8,100
Apricot	8,750	2,200	10,950
Cherry	11,125	4,450	15,575
Fig	4,495	2,500	6,995
Lemon	4,000	1,950	5,950
Nectarine	400	185	585
Olive	9,000	1,550	10,550
Orange	36,550	28,270	64,820
Peach	69,555	24,000	93,555
Pear	14,450	23,550	38,000
Plum	655	300	950
Prune	5,055	3,100	8,155
Quince	200	125	325
Total fruit	171,480	93,030	264,570
Almond	7,500	1,500	9,000
Walnut	2,500	750	3,250
Total nut	10,000	2,250	12,250
Grapevines (all kinds)	25,000	.....	25,000
Berries, acres, all kinds	325	.....	325

Fruits, Vegetables, Etc.

Green—	Total Production. Pounds.	Value.
Apples	58,000	$920
Apricots	21,000	420
Celery	4,500	125
Cauliflower	6,200	225
Grapes	8,200,000	40,125
Lemons (boxes)	90	270
Oranges (boxes)	750	1,500
Pears	2,000,000	40,000
Peaches	2,600,000	22,500
Peas	7,000	200
Plums	860,000	9,050
Quinces	25,000	225
Strawberries	2,400	280
Tomatoes	52,000	650
Cucumbers	65,000	6,050
Totals	13,901,940	$122,540

Dried—	Pounds.	Value.
Almonds	61,000	$6,100
Apples	1,500	95
Apricots	20,000	2,100
Currants	11,000	1,045
Figs	11,000	2,500
Pears	119,000	8,540
Peaches	300,000	12,000
Plums	850	340
Prunes	150,000	4,000
Raisins	135,000	5,800
Totals	898,350	$42,520

Canned—	Cases.	Value.
Peaches	67,000	$234,500
Plums	10,000	25,000
Totals	77,000	$259,500

Wines, Brandies, Etc.

Number of breweries, 1.

	Gallons.	Value.
Beer (barrels)	2,250	$11,250

Dairy Industry.

	Production.	Value.
Butter (pounds)	219,000	$525,600

Live Stock Industry.

	Number.	Value.
Cattle—Beef	4,100	$141,000
Stock	500	90,000
Calves	3,000	30,000
Swine	7,500	75,000
Horses—Thoroughbred	35	7,000
Standard-bred	23	6,500
Common	4,500	337,500
Colts	800	28,000
Jacks and jennies	25	1,000
Mules	.....	62,500
Sheep	55,000	165,000
Common goats	650	1,625
Totals	76,133	$945,125
Wool (pounds)	400,000	$73,000

Poultry and Eggs.

	Dozen.	Value.
Chickens	9,000	$54,000
Turkeys	5,000	10,000
Eggs	180,000	53,000
Totals	194,000	$117,000

Miscellaneous Products.

	Pounds.	Value.
Bees (hives), number.	.....	$845
Hops	1,800,000	370,000

Manufactories.

	No.	Number of Employees.	Value of Products.
Brick	1	.....	$18,000
Carriages and wagons	3	8	5,000
Cigars	2	10	4,250
Confectionery	2	8	13,000
Flouring mills	1	25	400,000
Foundries and iron works	3	150	2,100,000
Leather goods	4	25	30,000
Malt	1	6	3,000
Meat products—			
Hides	..	2	11,200
Lard	..	1	10,000
Meat packed	..	.....	250,000
Tallow	..	.....	3,780
Planing mills	2	35	190,000
Marble	2	5	7,500
Tin and galvanized iron	4	30	16,500
Wool scouring	1	20	250,000
Awnings and tents	1	.....	5,500
Soda works	2	10	25,000
Ice plants	1	15	30,000

Manufactured Output.

	Quantity.
Brick (thousand)	120
Cigars (thousand)	50
Flour (barrels)	67,200
Malt (tons)	60
Hides (pounds)	140,000
Lard (pounds)	102,000
Meat packed (pounds)	1,565,000
Tallow (barrels)	300

FOURTH BIENNIAL REPORT

OF THE

COMMISSIONER OF HORTICULTURE

OF THE

STATE OF CALIFORNIA

FOR

1909-1910

J. W. JEFFREY, Commissioner



SACRAMENTO:
W. W. SHANNON - - - - - - - - - Superintendent State Printing
1911.

LETTER OF TRANSMITTAL.

OFFICE OF STATE COMMISSIONER OF HORTICULTURE,
STATE CAPITOL,
SACRAMENTO, CAL., January 16, 1911.

To the Honorable Members
Senate and Assembly of California:

I have the honor herewith to submit for your consideration my biennial report, in accordance with the provisions of the law relating thereto, requiring such report to be made to your honorable body at each regular session. This report embraces an account of the leading activities of the State Commission during the last year, some recommendations upon the future work of the commission, and a financial statement, showing the persons employed and all moneys expended by the Commissioner in the prosecution of the work of his office. A more comprehensive report will be published early in the year.

Respectfully submitted.

J. W. JEFFREY,
State Commissioner of Horticulture.

O. E. BREMNER, Secretary.

REPORT OF THE STATE HORTICULTURAL COMMISSIONER.

Summary—Main Office.

SACRAMENTO, January 16, 1911.

The following summary of the work done by the main and divisional offices of the State Commission of Horticulture, will show some of the principal features of their activities during the year 1910. The principal features of the main office work were:

Mass meetings of fruit growers	27
Committee meetings of fruit growers	13
State fruit growers' conventions held	2
Meetings to organize fruit growers' league	4
Quarantine orders issued	3
Volumes report Watsonville convention	3,000
Volumes report Pomona convention	5,000
Bulletins, "Destructive Insects"	4,000
Circular letters, programs, horticultural topics	4,650
Letters written	3,420

Summary—Quarantine Division.

SAN FRANCISCO.

Number ships bringing fruits and plants	253
Number crates fruit inspected and fumigated (boat)	6,873
Number crates fruit inspected not fumigated (boat)	37,827
Number package plants inspected and fumigated (boat)	57
Number packages plants inspected not fumigated (boat)	3,105
Number packages plants inspected and fumigated (rail)	62
Number packages plants inspected not fumigated (rail)	229
Number crates and packages inspected, total	48,153
Number packages fruit destroyed	617
Number packages plants destroyed	133
Number packages destroyed, total	750

LOS ANGELES.

Fruit, total railroad shipments into State, inspected	458
Pineapples from Hawaii, cases reinspected	5,121
Tomatoes from Mexico, crates (22 car loads)	17,167
Bananas from Mexico, bunches	42,000
Bananas, from Central America, bunches	150,000
Alligator pears, boxes, baskets	115
Limes, from Mexico, destroyed, boxes	38
Mangoes from Mexico, boxes	87
Miscellaneous tropical fruits, crates, boxes	125
Total of above destroyed (boxes)	1,601
Total of above fumigated, boxes, cases	4,543
Released on inspection, crates, bunches, boxes	275,111
Car loads, trees, into State, inspected	4
Boxes, cases, into State, inspected	131

Boxes, into State, inspected (grafts)	23,260
Bales, packages, into State, inspected (trees)	28,928
Car loads, plants, into State, inspected	1
Boxes and cases, into State, inspected	203
Bales, packages, into State, inspected	180
Small lots, into State, inspected (plants)	1,954
Small lots, into State, inspected	1,954
Bulbs, cases, into State, inspected	344
Cuttings, boxes, into State, inspected	115
Total trees destroyed	512
Car loads fumigated	3
Boxes, cases, fumigated	361
Grafts, fumigated	5,060
Boxes, cases, dipped	95
Plants treated, bisulphide carbon	2,000
Cases treated, bisulphide carbon	10
Ships inspected, San Diego	25
Ships inspected, San Pedro	9

Summary—Insectary Division.

LIST OF BENEFICIAL INSECTS DISTRIBUTED.

Hippodamia, two tons, "lady-birds"	32,327,000
Cryptolæmus, "lady-birds"	2,018
Scymnus, "lady-birds"	1,200
Vedalia cardinalis, "lady-birds"	3,336
Coccinella abdominals, "lady-birds"	2,940
Rhizobius ventralis, "lady-birds"	6,769
Rhizobius lophantæ, "lady-birds"	130
Coccinella abdominalis, "lady-birds"	2,940
Cryptogamus orbiculus, "lady-birds"	2,730
Scutellista, Coccophagus, Comys fusca	127,380
Aphelinus fuscipennis, chalcids from China	2,012
Other species in small lots	2,585

STATEMENT OF EXPENDITURES.

SIXTY-FIRST FISCAL YEAR.

Express, freight, and cartage	$213 12
Extra help collecting parasites	141 25
Fruit growers' convention	176 65
Fuel, light, and ice	220 80
Inspection work expense	2,271 27
Library	36 50
Maintenance of insectary	602 77
Miscellaneous	284 06
Office equipment	171 50
Postage	570 00
Reporting vessels	156 00
Rent San Francisco office	360 00
Salary janitor	120 00
Salary assistant at insectary	595 82
Salary and expenses foreign field agent	2,755 30
Salary and expenses field agent	1,793 95
Telephones and telegrams	237 94
Traveling expenses of commissioner	744 95
Traveling expenses of secretary	273 90
Traveling expenses of superintendent insectary	273 90
	$12,165 00

(SUPPORT FUND.)

Statement of Expenditures Sixtieth Fiscal Year.

Express	$123 20
Freight and cartage	171 75
Field agents and extra help	2,440 79
Fruit growers convention	105 00
Janitors	180 00
Miscellaneous	344 54
Postage	345 00
Rent San Francisco office	300 00
Reporting vessels	166 00
Salary stenographer	783 00
Salary and traveling expenses deputy	1,163 95
Salary and traveling expenses inspector	706 80
Traveling expenses commissioner	373 15
Traveling expenses deputy commissioner	41 35
Traveling expenses superintendent insectary	61 30
Telephones and telegrams	194 17
	$7,500 00
Appropriation, sixtieth fiscal year	$7,500.00
Expenditures, sixtieth fiscal year	7,500.00

Sixtieth Fiscal Year.

[Expenditures Insect Appropriation, approved March, 1907.]

For searching for, securing, introducing, propagating, and distributing beneficial insects, and constructing suitable structures, and acquiring necessary appliances to carry on the work.

George Compere, salary and expenses	$1,031 67
Salary and expenses, superintendent of insectary	1,426 54
Salary and expenses assistant superintendent of insectary	860 70
Freight and cartage	62 42
Fuel and light	124 75
Expressage	10 95
Collecting parasites	139 00
Telephones and telegrams	30 30
Miscellaneous	396 83
Cost building and equipping insectary, January-June, 1908	7,916 84
	$12,000 00
Appropriation	$12,000 00
Expenditures	12,000 00

Sixtieth Fiscal Year.

[Expenditure remainder of Insect Appropriation, approved March, 1905.]

Salary foreign field agent	$68 33
Expenses superintendent state insectary	15 95
	$84 28
Balance of appropriation	$84 28
Expenditures sixtieth fiscal year	84 28

MAIN OFFICE WORK.

The Senators and Assemblymen are requested to read, carefully, the following portion of this report, and, from the plain statements therein, to consider the power vested in the legislature to protect and conserve the greatest single industry of California, and one whose prosperity adds such an immense sum annually to the material interests of the State. The most conservative figures show that fruit growing brings an annual revenue of $125,000,000 to this State. You have, by successive enactments, made it the duty of the State Commissioner of Horticulture to guard and promote fruit growing by every means within his power, and the laws have, in a large measure, given him the authority to do so. In recognition of the intention of these enactments I have, during the three years of my incumbency, sought many new avenues of assistance to the horticultural industries of our State, and several new and practical measures of helpfulness have been adopted, more than one of which have attracted general attention and approval. Whatever success may have attended these new policies is due to the fact that your Commissioner has taken the fruit growers into confidence, calling them together at every opportunity, discussing with them the best methods of applying scientific discoveries to orchard practice, conferring with them upon the difficulties they meet in producing and marketing their fruit, raising the standard of fruit-packing, and in every way seeking to improve the conditions, and protect the health of the orchards. In pursuing these new lines of work, the office has shown what a large field of usefulness it may reach, without curtailing the regular work of its departments, or interfering with the execution of the horticultural law.

STANDARDIZED FRUITS.

The deciduous fruit season of 1909 brought many complaints from the trade in the East and Northwest concerning the condition of the fruit pack arriving in their markets. Our records show that hundreds of car loads were rejected outright, or accepted at a loss to the shippers, or were in some way unsatisfactory to the trade, and, in one province, our fruit was refused admittance altogether. In order to arouse public sentiment upon the unfitness of much fruit shipped from the State, the Commissioner of Horticulture, about one year ago, began holding a series of mass meetings throughout the leading deciduous fruit sections. By the opening of the fruit-shipping season of 1910, we had held 27 of these growers' meetings in the counties, as follows:

Placer, 5; El Dorado, 3; Sacramento, 6; Solano, 2; Sonoma, 2; Napa, 2; Sutter, 1; San Joaquin, 3, and Tehama, 3. This work involved the holding of numerous committee meetings, making altogether 41 meetings attended by the State Commissioner, during the year, to promote the improvement of deciduous fruit packing. This movement resulted in organizing the counties of Placer, El Dorado, Tehama, Shasta, and San Joaquin, from which the fruit was standardized, 4,910 cars being shipped from these six counties, every box of which was packed to standard, and properly stamped by the official inspectors. The effect of this movement for better fruit packing was apparent in several counties in which the plan was not formally adopted.

Space will not permit a detailed account of the standardization plan. Briefly, it consists of the fixing, by an authorized committee, of a standard package for each kind of fruit grown commercially in the county. The growers are then called together, and adopt the standards. An agreement is signed by them and the shippers, not to offer any fruit, or to send out any fruit, that is not packed in conformity with the official standards. This movement is practical and effective, and its application is proving the greatest incentive to better cultivation, better spraying and thinning, and more care in every department of orchard work and fruit packing. If the legislators will consult the fruit growers wherever this plan has been tried, they will find every grower in favor of its continuance, and working for the further extension of the standardization idea. It has, in one year, brought one third of the fresh fruit under the provisions, and the plan should be carried to every section of the State.

STATE CONVENTIONS.

In addition to the series of meetings noted above, the State Commissioner held two state-wide conventions during the year, and various other conferences with the orchardists throughout the State. The convention held at Pomona was the largest conference of growers ever held in California, there being 610 delegates seated when the first session was called to order. Five sessions were held during the two-days' meeting, nearly 900 attending the second session. This conference was called to devise means of securing a thorough investigation of the citrus fruit troubles, in the groves all over the State. It resulted in the publication of a report filled with useful papers and live discussions, my office having issued 5,000 copies of this valuable book. The conference also brought about an arrangement through which years of research work and original investigations will be provided.

The Pomona convention was held the second week of September, and, three months later, the regular annual convention met for one week at Stockton. The latter was attended by about 400 growers, and was

marked by unanimity in all of its proceedings. The delegates endorsed the plan of fruit standardization promulgated by this Commission, and favored many measures for the advancement of horticulture, including a revision of the horticultural laws, the convention authorizing the appointment of a committee to draft measures amending the statutes. The committee consists of ten fruit growers, and its report will give you the opportunity of favoring such of the recommendations as, in your judgment, may be of assistance to our fruit industries. These State fruit growers' conventions are held annually, and oftener if the funds of the Commission will allow. The programs are made as broad and comprehensive as possible, presenting papers, and inviting discussion upon all phases of horticulture.

A new feature that has been inaugurated by the main office, is an attempt to improve the dried fruit business. Much preliminary work has been done already, by issuing circulars, inviting the dried fruit producers and shippers to adopt better methods, and preparing for the standardization of dried fruits during the present year. This movement will require a great deal of work, and, we hope, will prove as profitable as that of raising the standard of fresh fruits. Your Commissioner would also call attention to the high degree of coöperation now existing between his office and the various county horticultural commissions throughout the State. The law passed by the legislature of 1909, changed the number of county commissioners to one, instead of three. It provides for examinations to determine the fitness of candidates, and requires the supervisors to select a commissioner from the list of eligibles presented by a state board of horticultural examiners. Since this law became effective, the board of examiners has held examinations in nearly every county, and thirty-six counties have come under the one-commissioner provision of the act. A full account of the work in these counties will appear in the biennial report, to be published by the State Commissioner next March. The new law has had a profound effect upon the administration of the county horticultural commissions, and the law itself was drawn and advocated by the State Fruit Growers' Convention.

[Extract from Report of Deputy Horticulture Commissioner.]

Mr. J. W. Jeffrey, State Commissioner of Horticulture, Sacramento, Cal.

DEAR SIR: I respectfully submit the following annual report of the Quarantine Division of the State Commission of Horticulture, for the year 1910.

The work of the Quarantine Division has been marked, during the past year, by numerous changes in our methods of treating various matters. The work is becoming undoubtedly more complex, due to the advent of new steamship lines, with other new ones proposed, and to the increasing demand for foreign ornamental and nursery stocks, and fruits. We have followed the regular custom of meeting all boats incoming from foreign ports, searching for plants and fruits which are brought by passengers or by members of the crews, and later, after looking through the manifest,

we have seached for plants and fruits which arrive by freight or express. The danger of importing new pests has always been recognized, and the work of my predecessors has been marked by great thoroughness and care. But we have been, and are now, making the requirements of the quarantine inspections more exacting, and this, with the increasing work, has led to newer methods of treating various foreign stocks.

Our record for the year December 1, 1909, to November 30, 1910, inclusive, shows that we have met the arrival of 253 incoming ships, which brought in packages of fruits and plants. These may be listed as follows:

Forty-four thousand seven hundred boxes or crates of fruits, 6,873 of which were fumigated; 3,162 packages of plants or bulbs by freight or express, 57 of which were fumigated, and 688 packages of plants or fruits in the hands of passengers. A total of 291 packages arrived by rail, 62 of which were fumigated. During the year, 617 packages of fruits, and 133 of plants, a total of 750 packages, have been destroyed, or refused landing, because they were infested with injurious insects, or plant diseases, which were not known to exist in California.

San Francisco as a Quarantine Area. The city and county of San Francisco can not have a county horticultural commissioner under the requirements of the present law, and we, as members of the State Horticultural Commission, acting under our present appointments, can have no jurisdiction over any products which are forwarded into San Francisco from points within the State. There are arriving constantly, large shipments of apples infested with codling moth larvæ, oranges and lemons with purple, red, and yellow scale insects, and potatoes infested with scab. These are thrown on, and often weaken, an otherwise good local market. Many of such fruits are shipped out of the State, or out of the country, by local commission men. We do not allow shipments infested with our common pests to enter the San Francisco port, and we should not allow them to be sent out to other countries. This is a matter we should recognize, and which we can control if the members of our Quarantine Division could be given jurisdiction over fruits and plants in San Francisco county.

Respectfully submitted.

DUDLEY MOULTON, Deputy Commissioner.

[Extract from Report of Inspector, Port of Los Angeles.]

To the Honorable J. W. Jeffrey, State Commissioner of Horticulture, Sacramento, Cal.

SIR: I herewith submit my report for the year 1910. My work during the past year has largely been confined to the inspection of trees, plants, vines, cuttings, bulbs, roots, and fruits coming in from other states and foreign countries. I have also spent some of my time collecting insect food for the State Insectary, but, later on, my inspection work required so much time that I could not do this.

Most of the foreign shipments came into the State by way of New York and San Francisco. You will see, by my daily report, that the greater number of shipments come by way of New York.

In the handling of outside shipments of plants, trees, bulbs, etc., in the past year, I have been at quite a disadvantage in not having a quarantine station, or place where I could have shipments brought to be treated by fumigation or other means. I have had to do a great deal of my inspection in crowded freight houses, often where there was not room enough to open a box properly, and very poor light.

In order to improve this method, I would recommend that the quarantine officer at Los Angeles be furnished a station, centrally located, where he could have all outside shipments brought. He could then have room to properly inspect and treat them, by fumigation or dip. This would require, however, another man who could be at the station at all times. The expense of bringing the shipments to the station, and of treatment, should be paid by the consignee. In this way, very much better work could be accomplished than has been done in the past year.

In the shipping of plants, vines, seeds, etc., by express, lies the chief source of danger of bringing into the State insect pests and diseases. I have reason to believe that many packages containing plants, seed, etc., get into the State marked other than what they contain. In such cases, I have no way of knowing about them, unless I find out by accident. I have found the express companies always willing to comply with the law, and I am satisfied that the management of these companies instruct their men to observe and obey the law. There have been several cases in which new, or careless men, have let packages of trees and plants go out, without

notifying either the State or county horticultural officials. To all such cases as I have found, I have called the attention of the management. This has had the desired effect, and there have been but few cases where plants got out without my knowing it.

Since the bar was raised prohibiting Florida citrus seed from coming into the State, and allowing such seed to come in through the quarantine station to be treated by fumigation, 23 lots, or approximately 23⅝ bushels, have passed through, and have been fumigated.

Respectfully submitted.

WM. WOOD, Inspector.

[Extracts from the Report of Superintendent of the California State Insectary.]

Hon. J. W. Jeffrey, State Commissioner of Horticulture, Sacramento, Cal.

SIR: I have the honor to submit to you, herewith, a preliminary report for the year 1910, as your Superintendent of the State Insectary, an institution that has for its object the permanent advancement of horticulture and agriculture in all its various branches, and catering to every class of individuals engaged therein; dealing directly with that phase of the work where the presence of insect pests exert such an influence on the profits of fruit-growing or agricultural pursuits, and the attempt to counteract this annual loss, by the practical application of certain natural checks against these insect depredators, thereby lessening the cost of artificial eradication, and lowering the cost of production.

The Insectary has completely outgrown its primary object, and is hardly fitted to serve all the interests that have made demands upon it. This is probably due to the fact that it has been our aim to make this department a growers' department, and to be of real direct assistance to them as a body; to cultivate acquaintance with their troubles, and, lastly, always to work toward our motto of "Larger crops of better fruit for less money."

This report is necessarily in condensed form, and deals only with the most important items in the past year's work. As shown in the statistical report, we have distributed some 32,478,938 beneficial insects during the year, and in this connection we must mention the reciprocal recognition of its benefits shown by Wells-Fargo & Co., in delivering, free, all beneficial insects from the Insectary to growers, and also the free return of empty cases.

The distribution of beneficial insects is not the only work of the Insectary. Some 4,261 letters have been received and answered, without the aid of a stenographer, during the past year; an average of 14 for each working day. These letters cover a multitude of subjects, but for the most part are requests for advice as to remedies for insect pests, diseases of plants, orchard management, etc.

We have received 525 packages of express matter, sendings from our field agents, containing diseased and infested fruit for examination, insect pests to use as food for our propagating cases, donations of trees for use in the work, etc. One hundred and sixty-seven packages, containing specimens submitted for identification by growers generally over the State, covering practically the entire range of insect pests, and diseases of trees and plants. We have received, in all, 1,247 applications for beneficial insects, during the past year. Many of these (nearly 400), were for native species of lady bugs for use in the cantaloupe fields of Imperial Valley. After computing the acreage of all applicants in the valley, we were able to furnish 60,000 for each 10 acres planted.

We have received urgent demands from other states, and foreign countries, for shipments of beneficial insects, and besides filling requests of the United States Government, we have made shipments to Honolulu, New Zealand, Mexico, Formosa, Japan, and Italy. The principal importation of beneficial insects consisted of a species of lady bug (*Cryptogomus orbiculus*), which preys on the mealy bug (*Pseudococcus sp.*). The mealy bug is without doubt the most serious insect pest of our citrus fruits, to-day. It also attacks nearly all varieties of hothouse plants, grapes, palms, etc. Up to the present writing this insect gives promise of being a great success. It is reported as cleaning up an Emperor vineyard, in Fresno county, which was badly infested with the mealy bug, and is propagating rapidly in citrus orchards. At the same time, three internal parasites of the mealy bug were also imported, and are aiding in the work of destroying the mealy bug. These insects were all brought in by our field agent, George Compere, from the Philippine Islands. We have established a station for breeding these parasites, in San Diego county, in

charge of Assistant Superintendent Frederick Maskew. We also have substations in Ventura, Los Angeles, and Fresno counties.

There have been many other importations, among which are several species preying on black scale, from Japan and South Africa, also many aphis-feeding lady bugs from China and Japan.

The State Insectary has also acted as an educational institution to a mass of growers, and students of our high schools, and others, who have visited the institution in large numbers to become familiar with insects, both friendly and detrimental, as well as fruit-tree diseases, and methods of control for these crop destroyers.

Respectfully submitted.

E. K. CARNES, Superintendent State Insectary.

LIST OF THOSE EMPLOYED IN THE STATE COMMISSION DURING THE YEAR 1910.

J. W. Jeffrey.....State Commissioner
O. E. Bremner.....Secretary
A. G. Bird.....Clerk
Dudley Moulton.....Deputy Commissioner
William Wood.....Inspector
B. B. Whitney.....Assistant Inspector
R. E. Jeffrey.....Assistant Inspector
E. K. Carnes.....Superintendent State Insectary
F. Maskew.....Assistant Superintendent State Insectary
George Compere.....Field Agent
E. J. Branigan.....Field Agent
F. Bacon.....Field Agent
William Wicks.....Janitor

PROCEEDINGS

OF THE

THIRTY-SIXTH FRUIT-GROWERS' CONVENTION

OF THE

STATE OF CALIFORNIA,

HELD UNDER THE AUSPICES OF THE STATE COMMISSION OF HORTICULTURE, AT WATSONVILLE, DECEMBER 7, 8, 9 AND 10, 1909.



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1910

CALIFORNIA STATE COMMISSION OF HORTICULTURE

MAIN OFFICE:

CAPITOL BUILDING, SACRAMENTO, CAL.

J. W. JEFFREY, *Commissioner*.....Sacramento

O. E. BREMNER, *Secretary*.....Sacramento

MISS A. G. BIRD, *Clerk*.....Sacramento

GEORGE COMPERE, *Special Field Agent*.....Sacramento

E. J. BRANIGAN, *Field Agent*.....Sacramento

QUARANTINE DIVISION:

ROOM 11, FERRY BUILDING, SAN FRANCISCO.

DUDLEY MOULTON, *Deputy Commissioner*.....San Francisco

WILLIAM WOOD, *Inspector*.....Whittier

B. B. WHITNEY, *Assistant Inspector*.....San Francisco

STATE INSECTARY:

CAPITOL PARK, SACRAMENTO.

E. K. CARNES, *Superintendent*.....Sacramento

FREDERICK MASKEW, *Assistant Superintendent*.....Sacramento

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PROCEEDINGS

OF THE

THIRTY-SIXTH CONVENTION OF THE CALIFORNIA STATE FRUIT GROWERS,

HELD UNDER THE AUSPICES OF THE

STATE COMMISSION OF HORTICULTURE, AT WATSONVILLE, DECEMBER 7, 8, 9 AND 10, 1909.

TUESDAY, December 7, 1909.

Pursuant to call, the Convention met in the Christian Church, Watsonville, Cal., at 9.30 o'clock A. M.

The meeting was called to order by President J. W. Jeffrey, State Commissioner of Horticulture, Mr. O. E. Bremner acting as Secretary.

The Convention was opened with an invocation by Rev. D. T. Stafford, pastor of the Christian Church.

PRESIDENT JEFFREY. We will now listen to the address of welcome by Mayor Watters. I have pleasure in introducing Dr. P. K. Watters, Mayor of Watsonville. (Applause.)

ADDRESS OF WELCOME.

By Dr. P. K. WATTERS, Mayor of Watsonville.

Mr. Chairman, Ladies and Gentlemen, Fruit Growers of the State of California: It is my pleasure as mayor of this city, to welcome you. Not only is it my pleasure, but every citizen of Watsonville extends to you a hearty welcome. Representing, as you do, one of the greatest industries of this State, and coming, as you do, from every county, every district of this State, I hope that you were selected to represent this business according to your peculiar instinct for this. The fruit industry of this State is one of the first, one of the greatest, one of the most important of all the great industries of the State, and to you, gentlemen, into whose hands the care, the fostering, the upbuilding of this industry is confided, rests its case, whether it be adversity or prosperity.

This beautiful valley of ours, which you have chosen for your convention, the unchallenged home of the bellflower and the pippin, the place where the rose ever blooms and the geranium never dies, was not a thing of chance. God made it possible, but man did the work, and until God made man with sufficient brain and brawn to pull and grub the willows, with energy enough for the present and with that faith, hope, and confidence for the future, this valley did not represent the appearance that it does to-day. Yet the greatest age that this world has ever

known enlists her greatest product, her strongest force, man, at the head of her ever advancing army, in a contest not for twenty rounds nor forty rounds, but a finish fight, a contest not one of the sword or powder or bullet, not one of suffering, pain, and sorrow, but a contest that brings forth the higher, nobler principles of humanity. This is the contest, gentlemen, in which you are enlisted, and the time of service will expire when the curtain falls.

I am more particularly impressed with the dignity, with the high standing of this convention when I notice the names of the prominent men throughout the State, among which is one that I remember in my early boyhood days—I don't know that he is here—but away beyond the Rocky Mountains, beyond the once Great American Desert, in a little town in Iowa, it was a household name; a man whose family did more for the protection of the interests of the State University of Iowa than any other, and I want to tell you, gentlemen, if you have many men of the stamp and character of John P. Irish, as I knew him, the fruit industry of this State is in good hands.

In looking after the different interests, the different worms and moths, the microbes that infest the fruit, while I am not prepared to advise you or make any recommendations, I would suggest that you look after that little commercial bug that will bore in through the box and the wrappings, and all after you have it ready for its distribution, and kill the industry.

Now, gentlemen, Governor Gillett is here and will address you. Again I wish to thank you and extend to you the courtesy of this entire city. (Applause.)

PRESIDENT JEFFREY. In behalf of the convention, we thank the mayor for his pleasant words and hearty greeting at this time. Without further remarks, as the next speaker is capable of making remarks for himself, I have the pleasure now of introducing to this convention the chief executive of this State, Governor J. N. Gillett. (Applause.)

ADDRESS OF GOVERNOR J. N. GILLETT.

Mr. Jeffrey, Fellow Citizens: I am pleased to be with you here on this occasion, although I am suffering from a cold. The last time I had the honor of being present at a convention of this kind was in Marysville. I regret that I have not in the mean time had the pleasure of attending other places where you have convened.

It is well that the fruit-growers of California, representing all kinds and characters of fruit, should gather together frequently and discuss the great questions which are continually arising and confronting the horticulturists and viticulturists of California. California is just commencing—has hardly started in the growing of the fruits which will be consumed by the entire world. If you take this great big world of ours and divide it into an immense farm—which it is—you will find that in the south would be the field devoted to cotton; in the northern part of the Mississippi Valley and through Canada and those high plateaus would be the fields devoted to grain, and other parts and sections of the world are devoted to pasturage, but in all the world California would be the

orchard. We have the soil, the climate, the favorable conditions to produce in this section of the world the best fruit that can be produced anywhere, and questions will arise which are very important. We can not grow the fruit without a struggle against nature and against the pests. We can not grow fruit successfully unless we have organized together for the purpose of getting it into the market to the best advantage, and you can not raise fruit successfully and feed this country and Europe unless you have good transportation, both in the cars which you use and the rates which you have to pay. So, the question of fighting the pests, the question of forming associations to market the product, the question of getting good and cheap transportation, are the great questions that the people of this State engaged in fruit raising will be confronted with, and you must settle them.

I don't know whether any of you have visited the insectary built a short time ago in your Capitol grounds at Sacramento; if you have not, come there and see the work being done by the Horticultural Commission, the study being made there every day by those in charge, discovering the insect that will destroy the pests that infest our orchards. It is a most interesting study; it is growing all the time and should have the hearty support, as I suppose it has, of all the fruit growers of this State.

Another thing which I am satisfied you are all thinking about. It is very important that there should be an association by which the fruit of California can be intelligently handled and marketed. You can not take your fruit and dump it in the East and expect to realize much if it goes there by chance. You have got to handle it carefully; you have got to control the market; you have got to work with each other and not one against another. (Applause.) That seems to be the modern way of doing business. If you were in the shingle business in Humboldt County you would do it; if you went into the copper business you would do it; if you went into mining you would do it; if you were operating railroads you would do it; and I know of no reason why the farmers of the country that are producing the product that makes great wealth should not realize this great principle of business and get together and handle the product, and not see it wasted after it leaves your hands and is put on board the cars.

Another thing of great importance, which I keep driving at continually and all the time and never stop, would be the question of transportation. I would insist to the companies that are coming to California with their roads and making wealth here, that they should provide you people with the very best cars that can be manufactured for the purpose of safely and carefully carrying your fruits to the markets of the world, and I would keep after them continually until I got a rate which is fair and just. I think this question will be settled largely when the Panama Canal is constructed. I believe there will be a change at that time largely in the way of doing business between this section of the coast and the East. When we can bring from Europe or from the Atlantic coast large ships, land them here in Monterey Bay, in San Francisco Bay, in San Diego and San Pedro—in fact, in all the ports along our coast, and received from your hands the dried fruits which you can produce here and take them and deliver them in the

East or across the ocean in Europe, we will have solved then, to a great extent, the problem of transportation; and particularly in the south, you will find your railroad facilities better, cars will come faster and rates will be cheaper, because this, to my mind, is going to settle to a great extent the rates of transportation to the East.

I was told yesterday by J. O. Hayes of San Jose that they raised this year in Santa Clara County eighty million pounds of prunes. Sixty million have been ordered from Europe, showing that there is a great market growing for our dried fruits; it is a market that will be brought closer to us when this canal is completed.

There is another question, too, which seems to me an important one—it may not seem so important to some—they say it is a sort of hobby of mine, but I believe it is one of the most important questions in this State, considering the fruit we handle, and that is the construction of good smooth highways over which you can transport your fruit and get it to market in good condition. (Applause.) If there is a State in the Union where the people in the rural districts can be so much benefited by good roads, it is California. Our fruit is easily injured. If we have it injured in any particular, that is used as an excuse to cut down the price of it, but if you can draw two tons where you are now drawing one, with the same motive power; if you can make four miles where you are now making two; if you can get your fruit to the places where it is to be packed or whence it is to be shipped, in good condition, free from dust and not jammed or bruised, we will save thousands of dollars annually to the people of this State engaged in raising fruit.

I did not come here to make much of a talk, but I am glad to be with you. I know that the fruit industry of California is our great interest, and is becoming greater every day. I want to see our citizens do everything they can to encourage our horticultural and viticultural colleges that we are building, so that we may educate our people and educate our boys to go into the country and take advantage of the rich soil and the fine opportunities that our State offers to us. California is a place where the people can live happily in the country. California is a place where we can be prosperous in the country, and we want to do all we can to attract the attention of our people from our cities out into our valley—a valley like the Pajaro Valley, a valley like the Salinas Valley, valleys that lie north and south of us, with their rich soil, the abundance of water, the great possibilities to build up in this State the class of people you always find engaged in raising fruit and in that high class of farming. That is what California needs—a population in the rural districts—and I believe our fruit farms, where the man with a small acreage can bring up his family, offer the best inducements to this end, and their intelligent cultivation will tend in the future to bring into our valleys the kind of people desired. We want legislation for the purpose of protecting the interests of our horticulturists and of our viticulturists. We want the legislation which will enable our commissioners to see that nothing gets into the State which is going to be injurious to this great industry. We must be awake all the time; we must be watchful continually, because there is placed in your hands one of the great industries of the State, and an industry which will continue to grow greater and greater as the population of the State increases and as the population of the whole country increases, because California, as

I stated in the beginning, is the orchard of America, and from our soils and from our climate will go forth those things which the people enjoy as luxuries, and which they will purchase from us in abundance if we can get the right kind of article to them. (Applause.)

PRESIDENT JEFFREY. The Governor's remarks are certainly appreciated by all. They are as broad as his office itself, which means as broad as the State. Now, I will ask Lieutenant Governor Porter to come forward and say a few kindly words of welcome to the delegates and to his own people. (Applause.)

ADDRESS OF LIEUTENANT GOVERNOR WARREN PORTER.

Mr. Chairman, Governor Gillett, and Members of this Association: I think that, in behalf of the people of Watsonville and the members of the Orchard Association, I can say that they are delighted and pleased to have Governor Gillett pay an official visit to this valley, of which we are all so proud and the products of which speak particularly for themselves. Governor Gillett and Mr. Jeffrey have covered the ground very thoroughly in regard to why you are here and what you expect to accomplish. We have amongst us here in Watsonville a man who is working along the lines in a quiet way, unassuming, accomplishing a great deal for this State. I refer to Professor Volck, who has been amongst us since 1904, and probably has done as much as any man in California to combat the pests that beset our fruits, and I thought it was opportune here at this time to refer to him, because he is an exceedingly modest man; but it is those men who, in their quiet way, pursuing their course, accomplish a great deal. Mr. Volck started in an humble way, worked himself through the University, and after receiving that education from the great State of California, now is attempting to return to them some of the benefits that he has derived in a very material way, not only helping all horticultural interests in this valley, but going abroad throughout the State; and we who are here in the Pajaro Valley feel exceedingly proud that we have a man like that amongst us who is accomplishing so much good for the entire State. And, in conclusion, I will also say again that we are delighted, not only to have all delegates here with us, but, as I said before, to have Governor Gillett, who is heartily in sympathy with everything that is for the upbuilding of California and for good citizenship. (Applause.)

President Jeffrey then read his address, as follows:

ADDRESS.

By J. W. JEFFREY, State Commissioner of Horticulture.

Another year has passed since our last conference was held, and the oldtime organization which for more than a quarter of a century has marked time to the progress of horticulture is again in session to discuss matters of interest to the great industry with which its members are associated. The year just closing has been a season of great prosperity to the State at large, and has witnessed the forwarding of many splendid enterprises of a public character and the inauguration of many new ones all to the final benefit of the fortunate people who have found

a habitation in this delightful part of the Pacific coast. Many of our horticultural industries have been most prosperous, also, and yet others have experienced great depression. Broadly speaking, the outlook for the new year is very promising, and with a fair settlement of the many grave problems that are before the farmers of the State for solution the next few years should see remarkable and permanent improvement in the conditions that surround the business of fruit growing.

To a large portion of the people of California these conventions speak with authority, for they are composed of authorized representatives of the interest to which the State owes so much for her fame and material advancement. As the public comes to realize more fully that here assemble delegates with no individual interests to promote, free to speak and with courage to act, the influence of these conferences will be yet more potent in helping to shape the policies of state and foster the common weal.

That there are many new questions awaiting solution at the hands of such assemblages as this was brought most forcibly to the front by the experiences of the last two months in the Sacramento Valley. Since the first of October I have had the honor of presiding over four conventions, with an attendance in total of over one thousand growers, meeting in all-day sessions to determine what should be done to improve the conditions of more than one of our important fruit industries, and within the next few months as many more of these great conferences will be held as the time of your State horticultural officials can command. It was a revelation to me to see how these large communities of orchardists have attended so carefully to individual duties and allowed large abuses and difficulties to fasten themselves upon the business without attempting to dislodge the troubles by public effort. But since the holding of a series of these meetings, we can confidently expect that this or similar plans of considering the business problems of fruit growing has received an impetus that will carry the work to many other parts of the State, for this new movement has given vitality and force to the idea of overcoming difficulties by coöperation. So far every faction and element has joined without cross-purpose or friction, and, with one exception, by unanimous vote. As I may become somewhat pessimistic later on, I mention this spirit of unanimity as of the highest importance in the settlement of the vexed questions that may confront the fruit-farmers of the State.

In looking over the work attempted by these Sacramento Valley conferences one is astonished to see how the delegates avoided the speculative and cultural problems connected with fruit growing. Every moment of these day-long sessions was devoted to the business difficulties which had come to the surface so plainly the past season. The lesson I draw from this is that our State conventions should devote more of their energies to the solution of the economic problems that confront them, and that less attention be given to the mere increasing of fruit tonnage. I know that a State-wide convention like this must handle more general questions than the redemption of a market lost through wormy peaches. It must handle themes of interest to all. But there is no lack of large subjects for consideration and advancement by our present meeting. The interests of every commercial fruit producer in the State are involved in the farm-labor question; we should promote

the safeguarding of our trees from the further invasion of insect pests and plant diseases, by the thorough enforcement of the horticultural laws; freight rates upon fruits and prompt, efficient transportation; the improvement of our State markets and the search for every possible consumer in our eastern markets, through the most effective methods of coöperation and distribution that can be devised, and not the least of the questions that should be discussed is a general propaganda against the promotion of land schemes all over the State by syndicated orchards and vineyards planted for the sole purpose of selling the land. Our convention might also profitably consider tariffs, taxation of tree and vine, National quarantine against pests, noxious weeds, fruit sulphuring, standardization of all kinds of fruits and the proper and effective branding thereof. In fact, the range of subjects that is now engaging the field of horticulture is so great that we can not go amiss for something worthy of debate and determination at these sessions, and I earnestly hope our committee on resolutions will draw up a clear and forceful declaration upon every issue which its members deem important, and that the convention will pass upon the result after due discussion and voice its sentiments with courage and precision.

FARM LABOR.

These topics remind us in looking them over how easy it is to suggest subjects, and how difficult it is to bring them to a conclusion. The farm-labor problem, for example, is one of the most exasperating, and yet I have been asked to discuss it here. It is with great reluctance that I undertake to do so, for it is a tangle of social, political, industrial and racial elements. It is like the rainbow colors revolving upon a disk. You can make the color white, or any shade into black, or every color its own, by the way you turn the circular plate. I am not sure that this comparison is good, for there are many growers here who have been trying for years to make the labor question show white, and are convinced that it will require a different revolution from any that has been tried to make it show up in anything but somber hue. But to me the lights and shadows of this issue are sufficiently bewildering even if we could bring it down to the economics of the farm alone. And when the farm-help question is carried into sand-lot discussion, into argument sociological, ethnological, and everything but simply logical, a Philadelphia lawyer could not untangle the skein. But we will leave the agitators to explain how they can reconcile the dominance of the Pacific by America, with the policy of excluding the Asiatic from all reciprocal advantage, and look for a moment to the domestic features of the hired-help problem.

With the exception of pruning and one or two other items of orchard practice the scarcity of farm labor is felt altogether at harvest time. Fruit growing has not been a growth in California altogether if we consider the building up of correlative enterprises along with it in the rural districts, such as manufacturing, mercantile, and other subsidiaries. On the contrary, fruit production has become, in many lines, an accretion of large enterprises but little dependent upon each other in husbandry and dependent upon labor in large quantities but a portion of the time. If horticulture had been a steady, slow development, as was agriculture east of the Mississippi we would have been far behind our

present achievement, but there would be no labor question. If, in looking down closely into this industry, we find that it could not have been developed in any other way, and that it must be continued along the lines of large individual holdings, instead of being cut up into multitudes of very small farms dependent less and less upon hired help—if large capital is to be essential to our continued progress in fruit production, then we must look to the cheapest and most effective peripatetic labor that can be procured. Whether it be through large or small farms that California is to continue advancement I am sure that the subject of itinerant labor will always be with us in a great degree. For even upon the small fruit farm one man can grow as much fruit as ten men can harvest, and the question would be only solved to a degree, at best. In fact, one can not be sure of anything at this time upon the vexatious question of farm labor, except that it must be finally worked out upon economic lines. Whether that will come through the reduction of each horticultural enterprise to what one man can handle with the hired labor that can be had locally upon a year-long basis, as is done now in many of the citrus centers; whether these economics will come through the coöperation of both large and small enterprises in the same sections and the same lines; whether it will come through the absorption of small enterprises by the great with the ability to handle labor on the contract plan, or whether there is a good solution awaiting the genius of the fruit grower that will develop and protect our greatest soil industry without disturbing the freedom of each individual to farm just as much or as little land as he may wish—these are points upon which our delegates should shed all the light possible, for I am sure that the farm-labor problem is so great and so complicated that nothing but a far sight into the future will ever set it on the way of economic solution. At any rate I can see the futility of trying to adjust this difficulty without a concurrence of all the suffering enterprises in the State. A furtive effort here and there will avail nothing.

COMMUNITY COÖPERATION.

The farm-help problem is not the only one that should be treated upon the plan of broad endeavor. We find questions of paramount issue appearing every day, that can be handled only through general and authorized agencies. I was impressed with this lack of accredited responsibility during the session of congress at Washington last winter, in the contest over duties on imported grapes. A large body of New York fruit importers moved upon Washington with the determination to have the duties lessened, or removed altogether. A few of the California grape growers became alive to the danger, but they were without a trades representative at Washington and everywhere else. Appeals were made to the Governor, to the Lieutenant Governor, and to both branches of the State legislature to offset the work of the importers. Fortunately, an efficient California congressman had stood into the breach, and prevented the removal of the tariff. But I can not forget how helpless the grape shippers were, for they had failed to provide an effective authority in their own ranks who could bring every force to bear to prevent adverse action. Not so with the citrus fruit men, for *their* representatives were on the ground to look after *their* business, and gave all possible aid to the grape growers. I am aware

that a few small aggregations of growers have made some provision to centralize their demands and efforts, but the fact remains that nearly every large interest depends upon chance or the most inadequate effort to promote the general welfare of its business. The apple growers, the grape shippers, the growers and shippers of deciduous fruits, the prune and the raisin men and the dried fruit interests should each have a league or a protective committee of some kind authorized and supported for the purpose of handling every proposition that has a general bearing upon the prosperity of the business, and to whom all could look in times of danger, or in the promotion of any measure of benefit to the whole industry. I earnestly recommend that this convention take up this matter of trades representatives, and urge every industry to make provision for the handling of its difficulties through some plan that will bring its every element into harmonious and effective action in the promotion of all its trade interests, and in protection from its perils.

OVERPRODUCTION OF FRUITS.

Again we are confronted with the cry of overproduction of orchard and vineyard commodities. We are told that thousands of carloads of grapes and peaches were grown this season and sold without one cent of profit to the producers. And it is true. The dire prediction is made, also, that the next few years will witness an avalanche of table grapes, for example, that will literally swamp markets now burdened with all they can bear. We are informed that one county is overflowing with seedless raisins upon which not even a bid has been received, much less a sale made. And this is true, also, for I had it from one of the heaviest growers in the county. How many tons of other raisins and of prunes remain unsold we shall have to leave with those versed in pessimistic figures. Even if I had the figures I would not dare to quote the tonnage of dried fruits and other fruits that never *is*, but always *to be* sold at profitable prices. Men have told me how many acres of Tokays they did not gather last fall, but I do not wish to dwell on these evidences of overproduction, for one can make himself an outcast in this way if the so-called land boomers and boosters find him out. But if you will not tell it abroad I will say to you that overproduction is a grim reality in this State in every line of fruit that is produced largely of inferior quality, or that is held for speculation when fair prices have been offered, or has not been provided with adequate means of distribution. These saving clauses make me an optimist in fact, even while setting before you the *facts* that under our present system of farm leasing and other poor methods of fruit growing, and the practice of holding large quantities of products by the growers for speculative purposes, and the practice of sending everything into the markets, and the general failure of giving the fruits broad and effective distribution, we have a surplusage. I say that in lines where these failures have occurred the outlook for profitable returns never before looked so hopeless. Of course, these growers are attempting to do an honest and straightforward business, and do not expect the profit that would accrue if they were to pull up their orchards and plant the land to eucalyptus or ginseng. But they see that their methods have not been the best, and one can not be pessimistic, or be overcome with the nightmare of overproduction, when he sees these growers engaging themselves in revolutionizing their methods in every possible way.

Then, let us all face this issue like men and women devoted to the permanent upbuilding of our greatest and most distinctive industry. The real issue is not overproduction as much as it is under-consumption of our orchard products. That is to say, there is yet room for all the first-class fruits—first-class not only in quality, but in ability to hold up well while being offered at retail. This brings to consideration the fact that California has gone head over heels into too many fruit enterprises, without proper reckoning with the market day; instead of establishing these enterprises by unfolding them in a natural way the State has inflated them, too often, into the full-blown achievement of production, without businesslike provision for selling the output, or even offering it in a way to prevent congestion. We are not here to join in the mad chorus of promoters that has so long glorified California horticulture without a grain of caution or a mite of common sense. The members of this convention are neither fogies nor faddists nor men given to bloviation for the sole purpose of stimulating activities in real estate. They will voice hopeful, inspiring sentiment concerning the present and the future of California horticulture, outspeaking with the optimism of faith the confidence of power and the courage of understanding. But they are endowed with the wisdom to condemn the foolishness and shun the danger of blindly grinding out increasing tonnage of both inferior and superior fruits without thought of the future. If I do not mistake the spirit of this conference of fruit men it will reaffirm the doctrine of "California fruit for the world," and at the same time refuse to sanction the horticulture of the "Hurrah" kind that is now menacing the very life of several of our most cherished enterprises; if I do not mistake the attitude of this convention upon the subject of overproduction, it will neither color its action to suit the exigencies of land sales nor encourage any doubt as to the future that is not justified by the experiences of the past; and if I do not miscall the courage and independence here represented, this assemblage will resolve with unmistakable emphasis upon the folly of trying to build a great and permanent industry without giving attention to the foundations upon which it must rest. I hold these ideas with confidence and serenity, notwithstanding the grave crises we are facing, for I have seen within the last few weeks convincing evidence that the fruit men of the north are not afraid to face the truth with open minds, and are not afraid of their own conclusions.

STANDARDIZING FRUITS.

One of the corner stones of a successful and permanent business is the recognition of the interests of its customers. Whole communities of orchardists are preparing to recognize this principle in greater faithfulness than ever before, and in looking into the causes that may have violated this tenet it is not surprising that the growers of good fruit are realizing that their strongest business opponents are the growers of poor fruit. This feeling has given life and vitality to a series of remarkable meetings of late, and in which the sentiment to this effect was unanimous. It is encouraging to the fruit business that growers and shippers not only realize this, but are working out plans to escape from this deadly internal peril. Suppose we could at one stroke reform the conditions of farm labor, idealize our selling facilities, provide

broad distribution for all our products, and remove all adverse elements from the business of fruit growing except those of dishonest packing and branding. We should have still to face a most formidable peril, and one that would finally cause the downfall of our greatest soil enterprise. So great is the movement toward community uprightness in packing and branding our orchard products that it is unnecessary to state in detail the abuses against which is now mobilizing this great force of reformation. Nor can I trace how gradually and through the stress of bitter experience the orchardists are coming to the conclusion that fruit growing is a business as well as an occupation; that sense and discrimination in marketing are as essential as success in the production of superior fruit and greater tonnage. Nor is it necessary to remind this intelligent audience that the new movement of business introspection is a part of the great moral uplift in business throughout the country. It is sufficient that this movement to standardize and honestly brand our fruit products has its foundation in commercial common sense, and its hope in the declaration of our leading growers that an enemy is in their own camp wearing the livery of horticulture and producing qualities of fruit and enforcing methods of packing that has imperiled the whole business.

LAND BOOMING.

In discussing the economics of horticulture I have held that sufficient attention is not given to the more obscure influences that have an adverse effect upon fruit growing. Yet, for the very reason that an element is insidious, it may be the most dangerous. I am aware that I am now coming upon dangerous ground, for, unfortunately, there is no clear-cut line between legitimate and fraudulent land booming. Some land schemes are neither honest nor bogus, but in effect are certainly not for the best interests of the State. If they could all be made absolutely fair, or absolutely dishonest, or half straight and the other class crooked, there would be less trouble, for the law would handle the latter, and the public could masticate the former without distress. It is the insidious class that is dangerous. Few will allow themselves to be bitten by a rattler, but no one pays much attention to the bite of a mosquito. So it is that our growers will fight blights, and scales, and worms, and yet pay no attention to certain influences at work much more destructively than insect pests. Suppose one could segregate the acreage of orchards and vineyards now being hopelessly and indifferently farmed and tally it all on one sheet. It would be a vast community of alleged growers who had been induced to go into the business through roseate promise and extravagant claim, largely the victims of their own inadvertence and the disinterested promotion of the land seller. Hundreds of promoters are engaged in sugar-coating poor land with grapes, and oiling inferior soil with eucalyptus to make them swallow easily to the investor. This insidious practice is permeating many of our *fruit* industries, and it makes honest and efficient fruit growing realize that there is something wrong with it, but as yet it seems to have failed to locate the obscure point of infection.

If you think the virus of land speculation is not poisoning the horticultural interests of the State, go to some prominent section given to

the growing of table grapes and there make a few observations. I was told last Friday by a grower who is now in this audience that scores of men in one locality had been bankrupted through purchasing land previously stubbled over with indifferent grape cuttings just to sell the land, and at exhorbitant prices. I know of one tract of several hundred acres of sand syndicated to prunes, olives, and peaches and sold at fancy prices just because the trees were there, keeping the purchasers for years between hope and despair until the sheriff kindly intervened. I was called upon some time ago to make a report upon 2,000 acres of land set out to deciduous fruits by a syndicate and sold at $375 an acre. It finally failed altogether, with a loss of half a million dollars to the investors. And yet these half-fraudulent and most always ill-considered ventures are profitable to the promoters, however much they hammer down the reputation of the State as a good place for investment and congest the fruit markets with an added burden of inferior products.

But we can not take away the right of an American citizen to be swindled, or to plunge into something he knows nothing about, and under conditions with which he is altogether unfamiliar. So we can not expect the public to come to the rescue on account of the suffering investors. But the public should concern itself with the real menace of this class of land booming, for it is the fruit-growing public that is in danger. It is the men who have put their money, their brains, and the very heritage of their children into the fruit business who are coming to suffer most acutely from this unnatural and stimulated system of land selling. The outlook is for continued exploitation, and more and more low-grade fruit, and greater market depression, increased uncertainty in land values and damage to all the interests of the Commonwealth, whether directly or indirectly connected with the cultivation of the soil. I leave this topic to the earnest consideration of the convention, with the hope that every friend of the real and permanent development of our State will discourage every form of promotion which is in fact retrogression.

In leaving to your judgment the introduction of any other subjects that may seem of moment to the members of this conference, and in the work altogether of the week I hope that every delegate will feel that this is his convention and take a lively part in the discussion. I have not by any means exhausted the list of pertinent questions that might with profit be considered. I thank you for your attention at this time, and trust to be able with your assistance to make the convention a success.

We have fared along with this address with commendable patience on your part, I am sure. This afternoon the program will be continued, and in presenting it after this morning's exercises I am reminded of an early incident in my career. Thirty years ago I was the oldest of an alleged choir of four brothers and five sisters, and we sometimes attempted to sing in public, because, perhaps, we lived in a tolerant neighborhood. At a Sunday-school picnic one time, after my choir had sung for these patient farmers, as long as the Mayor, the Governor, Lieutenant Governor and I have talked to you to-day, the Sunday-school superintendent stepped forward to introduce the string band of three pieces from a neighboring farm. "Gentlemen and Ladies," he said, "we have had the singing, now we will have some music." This afternoon the real music of the convention will begin—

the music of experience, and discussion, and endeavor, to promote by every means the best fruits, the best markets, and the best of everything that may advance the resources of the best State of all of Uncle Sam's great domain. Again I thank you. (Applause.)

MR. BERWICK. I would like to employ a few minutes now, if the convention would be pleased to hear me, as my time here is very limited.

PRESIDENT JEFFREY. We will be pleased to hear from you Mr. Berwick. You are an honored member of this convention and have been for years. (Applause.)

MR. BERWICK. *Governor Gillett, Mr. President, Mr. Porter, and Gentlemen of the Convention:* I am sure you are all pleased and unite with me in thanking the Watsonville people, including Lieutenant Governor Porter, for their kindly reception here this morning. I know, also, you will concur with me in thanking Governor Gillett for his good suggestions made to us this morning, and also Mr. Jeffrey. I want to remark on one thing Governor Gillett has said, that the Panama Canal is one great hope of the fruit growers. You may recall that for many years I had the honor of being chairman of your canal committee. In fact, I believe I was all sorts of a crank—among others, a canal crank. I am glad now to be officially justified, and to know that the canal is largely the hope of California. I am glad to hear, through Mr. Jeffrey, that this convention as a whole is not here to discuss small questions, but economics is one of the great things we are here to talk over. I have been talking over economics on behalf of you fruit growers for a good many years. You may recall, in Los Angeles, about five and a half years ago, you growers kindly put me at the head of what we call the Postal Progress League of California. It was one important effort toward solving the transportation problem. You know other countries have a very efficient postal service that carries parcels of all kinds of things through the mails and assists very much in distributing large quantities of produce. A man from Japan the other day told me: "In Japan I had butter sent 700 miles at a charge of 25 cents for a ten-pound package." A lady told me about two days ago: "I was living in England, a little way from London. I had oysters sent me through the mail." You can have all sorts of things sent by mail there and distributed very economically to consumers. One of your great problems is economic distribution, to get as directly as possible to those who consume your products. The parcels post is one of these agencies. In England one house of seedsmen sent out 70,000 packages in two days. You can see the extent to which they avail themselves there of parcels post. If you are a farmer you can have the mail cart stop at your gate, on your giving due notice, and take your products from your gate to distribute all over England, at very low rates. Germany has the same agency; even Japan has the same agency.

For five and one half years, as some of you know, I have been working to influence politics here that we may have congress give us the same agency. It depends entirely on congress. The President has no power, the Postmaster General has no power to alter the rates, but congress has. But, as you know, gentlemen, unfortunately the machine largely dominates politics and the transportation companies largely dominate the machine. There is one way of getting this thing, and one only,

that is, for you people to make your voice heard with no uncertain sound as to what your wishes are.

I had a lesson some years ago at Stanford University. I was one who spent a week there some years ago, a week to fruit growers they gave us when the university opened. I was a tenderfoot about college yells—I had been in the backwoods most all my life. I was sitting in the Encina dining hall and I was electrified by the shock of hearing something like this: "WE-WANT-OUR-PUDDING!" Do you know what happened? What do you think happened? The boys got their pudding. Now, when you want parcels post badly enough to halloa together: "WE-WANT-A-PARCELS-POST," you will get it. We meet here, have been doing so for twenty-five years past—I have—and I recall in Los Angeles in one of the earlier conventions I moved some resolution. Mr. A. R. Sprague, whom many of you know, said: "What is the use of passing resolutions, anyhow? They don't amount to anything." I recall I replied in some lines of Lowell. I said: "My friends, you can't put less value on these things than I do. I will give you a quotation from Lowell. It is in the Yankee dialect, something like this:

> "'So they meet in convention and git up hooraws,
> An' tramp through the mud for the good of the cause;
> An' think that they're kinder fullin' the prophecies,
> Wen they're only just changin' the holders of offices.
> Where A sot before B's now comf'ably seated,
> One humbug's victorious and t'others defeated;
> Each honorable doughface gits just wat he axes,
> An' the peepil their annooal sof' sawder an' taxes.'"

Now, gentlemen, I am here to-day to tell you this. We can't often get a chance to do anything at Washington. Most of you know Mr. John S. Dore of Fresno. He is a good, sterling man. He writes me he is willing to go to Washington, he and his wife, and settle down there for the session and fight for parcels post for you, if you will just pay their railway fares; he will do the rest. I want you to think it over. If you want something done, now is the chance to do it. I have been trying to do all I can. I have a letter in my pocket now from the Postmaster General's secretary saying when Mr. Hitchcock gets through his week's work on his report he will take up parcels post, but he will take it up a great deal more vigorously if all you people shout. If you want an easy way of regulating transportation there is no better way than by demanding the parcels post. Now, I don't mean to stay here—I have got another engagement—through this whole convention; that is why I came on this morning, through the kind permission of the authorities, but I will appoint Mr. Charles Rodgers, Mr. A. N. Judd, and Mr. B. E. Hutchinson of Fresno to receive any contributions you want to give to send Mr. Dore on to Washington. If you think it is worth while, do so; I know how the fruit growers are usually; when it comes to paying down their cash they are not exceeding rapid; but I understand in Watsonville you growers are all bankers as well as farmers, and so I appeal to you to help yourselves. Heaven helps those that help themselves. Now get it, and hustle and help yourselves. I thank you. (Applause.)

PRESIDENT JEFFREY. I thank Mr. Berwick very much for his talk. We will now adjourn until afternoon.

A recess was here taken until 1.30 o'clock P. M.

AFTERNOON SESSION.

PRESIDENT JEFFREY. If there is no objection to the regular order that has prevailed in these conventions for a generation, I will now announce the vice-presidents and the two committees which we have always had. The vice-presidents will be C. H. Rodgers, representing the fruit growers of Pajaro Valley, and E. J. Wickson, representing the Agricultural College of this State. The Committee on the President's Address will be G. P. Rixford, representing the United States Agricultural service, and Roy K. Bishop of Orange County, one of the horticultural commissioners of the State. The Committee on Resolutions will consist of George D. Kellogg of Newcastle, A. N. Judd of Watsonville, and J. P. Dargitz of Acampo. Mr. Kellogg is a fruit-grower and shipper. Mr. Judd is too well known to need any introduction to this community or to the members of this convention. He always attends, and he will do his work on this committee. Mr. Dargitz is the secretary of the California Fruit Growers' Exchange, resides at Acampo and a fruit gower at that place. The first paper on the program this afternoon is "Southern Oregon Apple Growers—Rogues in Name Only," by Mr. William M. Holmes, a prominent apple grower of the Rogue River country and a resident of Medford. Mr. Holmes has written me that he was called on a water lawsuit occupying yesterday and to-day, but he has sent his paper and it will be read to you and subject for discussion the same as if he were here. The secretary will now read the paper.

SECRETARY BREMNER. I might say that this gentleman has two boxes of apples here, showing their standardization and uniformity of pack, which are down at the Board of Trade rooms, where you can see them.

SOUTHERN OREGON APPLE GROWERS—"ROGUES" IN NAME ONLY.

By Wm. M. Holmes, Medford, Oregon.

It is a somewhat significant fact that the Rogue River Valley in Oregon, where the writer has resided for the past twenty-six years, owes its present position in the world's fruit trade largely to the good judgment and horticultural knowledge of a veteran in horticulture from the State of Illinois. There is no better illustration than his experience furnishes that methods of culture and selection of varieties must conform to local conditions. From the day when Hon. J. H. Stewart, now deceased, first saw upon the banquet tables of the Pioneer Association, assembled in annual reunion at Jacksonville, Oregon, a finer display of prime apples than he had ever seen at a state fair in the Mississippi Valley, he became a staunch advocate of commercial fruit culture in southern Oregon. Urging upon his neighbors in the early eighties, before as yet the transportation was provided, the necessity of preparing to supply the Eastern demand for such choice fruit, he himself planted more than one hundred acres of apples and pears, fortunately including

a good proportion of yellow Newtown pippins and Bartlett pears. Unfortunately, as usually happens when horticulture is in the experimental stage in a new district, many varieties were set which later proved not to be good commercial kinds, although yielding good crops. At that time there were many small family orchards scattered through the valley, affording a demonstration of what varieties were best adapted to the soil and conditions. A favorite among the early settlers, and found everywhere throughout the valley, was the Esopus Spitzenburg. Prior to the advent of the railroad, there were practically no fruit pests. The codling moth did not make its appearance until about 1890, closely followed by the San Jose scale. With the scale, those thrifty old family orchards became a matter of history. No effort was made to save them, and for a time even the commercial orchards seemed to be doomed. When the first salt-lime-and-sulphur formula was introduced, even applied with the crude man-power sprayers then on the market, it was apparent that science had triumphed over the pest. When gasoline power was used, and the first gasoline engine used for this purpose was equipped and used in a Rogue River apple orchard, very effective work was done in spraying, and each year has seen an advance in methods and a wonderful growth in acreage of orchards in the valley, until to-day there are no less than fifty thousand acres of apples and pears planted and approaching maturity in the valley.

To-day the major portion of the apple trees planted each year in this district are of the yellow Newtown and Spitzenburg varieties. Since the first shipments were made directly from the grower to the distributing firms in London, the English trade has shown a decided preference for the Newtowns from this valley, and since the year 1900, when the grower first came in direct touch with the market here, the price has been uniformly good, car consignments frequently averaging three dollars per fifty-pound box, free on cars at shipping station. Until within three years there was the same effort made by the grower to excel in size of individual Newtown Pippins that still distinguishes the demands of the American red apple trade. It became evident, however, that the more conservative Englishman finds the four-tier, or 128 to the box, size more to his liking than the abnormally large apples, and that is the type most sought for at present. The tree is hardy, vigorous, and very productive in this section, and the smaller sizes being most in demand, the labor and expense of thinning the fruit of this variety is reduced to the minimum. The tree is allowed to bear to the limit, and in case of an unusually dry summer, if water is available, two moderate irrigatings are given the trees. Irrigation is not here considered essential, and yet all concede that it adds immensely to the yield of all apple trees, especially those over fifteen years of age. It will be resorted to much more in future than in the past, for as yet the bulk of the orchards in the valley are young.

Oregon prides herself especially upon her "red" apples. And yet the best of all the red apples, and the one best adapted to Oregon conditions, the Spitzenburg, has not proven nearly so profitable as the Newtown in the orchards of southern Oregon. Nor can it adapt itself so well to all soils, ranging from the volcanic ash to the black adobe, in all of which the Newtown thrives. When the conditions of soil are just right for the Spitzenburg, however, that blend of alluvium or sediment soil with

the wash from the foothills, on which was produced the car lot of Spitzenburgs which in November last won the capital prize at the Spokane apple show, no other district on earth can surpass the Rogue River Valley in its production. The orchard which this year won for its owner the crown of an "Apple King," has produced car after car of just as fine apples in the past, but awaited the sagacity of the man who knows and the man who had the enterprise to enter the contest to win plaudits from ocean to ocean. Through the medium of the writer, the present owners purchased this orchard in 1906, men entirely without experience in horticulture, and it is sufficient to say that they have deserved all the success they have obtained in winning this world's prize, for they have applied good, hard business sense to the management of their orchard, and there is no better in the best district in the Northwest.

The close student of the markets knows that in the immediate future other varieties of apples will be planted largely in the Rogue River Valley, although to-day even the residents find it difficult to procure the Rome Beauties, the White Winter Pearmains, Yellow Bellefleurs, Jonathans, and Ortley Pippins, which once filled their cellars for winter supply. Of these, the Rome Beauty and the Ortley will unquestionably be planted in a commercial way, on account of their uniformly high quality and productiveness. The Jonathan and the Stayman Winesap will also divide honors with the Spitzenburg for both are productive, very precocious in bearing, and much hardier than the Spitz. It is even predicted that in certain locations in a few years blocks of Ben Davis will be set, for that old standby is holding its own in productiveness, and with all its inferior quality, there are orchards in the Rogue River Valley of this fruit which are almost as good yielders in dollars as the choicer fruits.

In setting an apple orchard in this valley it is the uniform practice to use yearling nursery stock, and many prefer the medium sizes to the overgrown stock which was once in greatest demand. It is preferable to set on land which has been in cultivation for some years, and many of the most flourishing young orchards are growing on land which had been "farmed to death" in the days of wheat production. While the apple itself is a shallow-rooted tree, it finds the elements it wants in the subsoil below the level robbed in grain culture through former years. Thorough preparation of the soil, often with subsoiling at least the tree-row, is practiced and after setting the land between the rows of trees is either cultivated with spring-tooth harrows, extension tools and weed-cutters, or planted to corn, potatoes or other hoed crops, and at times set to berries. Berries, however, require irrigation to be successfully handled, and our growers do not, as a rule, approve of irrigation for young trees, at least not until they have grown for some years with surface cultivation. The idea is that the roots of the young trees will extend further into the subsoil without irrigation, which may or may not be the case. Corn is the great "expense crop" grown between young trees in this valley. Other varieties come into bearing younger, but if an expense crop is produced on Newtown or Spitzenburg trees the sixth year in this valley, the grower is well satisfied. Many are now resorting to peach tree fillers, to expedite returns from the orchard, and this course is now considered good management, as conditions for

peach culture are very good also in this valley. The markets, too, are accommodating, the northwest coast cities growing rapidly, and the product of the different varieties of peaches produced here coming to maturity after the California crop and in advance of the Columbia peach districts. It is customary to remove these peach tree fillers at about the tenth year. Some are setting them in the apple tree-row one way only; some in the center of the square. Of course, it adds greatly to the labor of cultivation.

While it is true that with the scale and the codling moth to combat, the southern Oregon orchardist can always keep busy, yet it is also true that, aside from these two foes, apple culture in this valley is beset with less trials than in almost any other district. Young trees are afflicted with green aphis, but the tobacco mixtures are found very efficacious, and fortunately there is but little trouble with the woolly aphis. Anthracnose at one time caused some solicitude, but Bordeaux applied before the leaves drop and again later in the season not only acts as a preventive, but effects a cure if the trouble is not of long standing. Apple scab is not a menace, the long dry summers protecting from this foe to the yellow apple. Some varieties of the apple are rather susceptible to the pear blight, but with ordinary caution it is handled successfully.

The class of men who are devoting their energies to apple culture in this section is perhaps the best guarantee we have of its continued success. There are probably two thirds of the men engaged in horticulture in the Rogue River Valley who have retired from active business or professional life, drawn back to the soil by that agrarian movement which bids fair to reverse the current from the farm to the city; and but very few orchards in this valley are in the hands of tenants. There are far too many large holdings in the valley, inviting labor troubles in the future. Thus far, the output of the orchards has been easily handled, but each year for several years to come should double the number of cars shipped, and it is foreseen now that the surest provision against labor scarcity will arise from the small land holder with surplus teams and help within his own family. Many of the large orchardists at this time are enabled to compass their field work in due season by offering especial inducements to neighboring men, with teams and equipment, and this phase of the business affords the man with a family of growing boys the opportunity to develop his own small orchard and obtain the wherewithal to live and improve his tract with surplus work for others, at very remunerative figures.

The regularity of crop production is here remarkable. Four times within the last ten years good apple crops have obtained high prices, owing to the short crops in the Eastern States. This has much to do with the immense returns obtained by our orchardists each year. Late spring frosts cause some damage, but with commendable system, and with the assistance of the government pathologist now stationed at Medford, during the last season telephone alarms were sounded on critical nights, and orchard heaters and small piles of light, dry wood, ignited with kerosene, saved the crop on low ground and demonstrated the possibility of thus saving the crop every year. This work was really without the province of the pathologist, but at the solicitation of our horticulturists, and with the consent of the weather bureau officials, Mr.

O'Gara very accommodatingly placed his knowledge at the disposal of the growers.

The matter of standardizing the pack of the valley has received much attention during the past year, and through the different associations of growers, it is a certainty that within another year this valley will be distinguished by as uniform pack and thorough business marketing of of our product as now characterize any other district. Each year it becomes more apparent that quality and uniformity alone will bring the largest returns. (Applause.)

PRESIDENT JEFFREY. I would like for the delegates to jot down any point in any of these papers that you wish to discuss afterwards. You will be given the opportunity now to discuss this paper, if you wish, for a short time, but at the end of the session we should have these matters thoroughly discussed. This paper just read is a very valuable paper from an Oregon standpoint. Mr. Holmes was an old friend of mine. I have not seen him in thirty-five years and I hoped to have seen him to-day, but I have had correspondence with him and know that he is succeeding in the same things in which you are succeeding here in Watsonville. I now have the pleasure of calling upon Mrs. Josephine Rodgers of Watsonville, who will speak on "Apples on Our Menu." (Applause.)

MRS. RODGERS. *Mr. Jeffrey, Governor Gillett, Ladies and Gentlemen of this Convention:* I think on this occasion I can fully sympathize with men that have been called to address our women's conventions. In this case women are in a minority in the audience as well as on the program.

APPLES ON OUR MENU.

By Mrs. F. J. Rodgers, Watsonville.

There is no fruit which has so many legends associated with it, or so much mythical history connected with it as the apple. It being such a common fruit, few people stop to consider its food and medicinal value. It is an excellent brain food, because it contains more phosphoric acid in easily digested shape than any other fruit known. Eaten raw, there is no better stimulant for the sluggish liver, as an apple or two eaten before going to bed will often be more effectual than the use of drugs. It helps the kidney secretions, and prevents calculous growth. It obviates indigestion, unites surplus acids of the stomach, disinfects the mouth, and is one of the best preventives of diseases of the throat. It also promotes sound and healthy sleep.

It is a welcome visitor to the housewife, epicure, and invalid, and grieves no one unless it is the doctor. No doubt this old saying is familiar to you all:

"An apple a day
Will keep the doctor away;
An apple at night
Puts the doctor to flight."

Aside from its splendid medicinal values it is one of the best antidotes known for the thirst and craving of persons addicted to the use of alcoholic stimulants.

Books have been written on the curse of drink and its cure; institutions have been founded for the recovery of the inebriate; different

kinds of drugs and patent medicines have been placed on the market; much money has been spent seeking cures, and persons will suffer all their lives from this habit, when this simplest and most inexpensive of all cures lies within their reach. No man or woman who likes fruit has an appetite for drink and *vice versa*. The two tastes are at enmity with one another, and can not live in the same constitution. One will destroy the other.

The necessity of fruit all the year around as part of the daily diet is generally acknowledged, and among fruits the apple heads the list, and hence should occupy a prominent place on our daily menus.

The different ways in which the apple may be served are almost without number, though the ordinary cook has on her list just about three—apple sauce, baked apples, and apple pies. While these are delicious, the housekeeper should guard against monotony of diet. The manner of cooking and serving the same thing makes a wonderful difference. With the apple fresh, canned, or dried, the housewife finds a splendid addition to her supply closet, and may prepare at any season on short notice many delectable dishes. Among the most attractive delicacies obtained from this fruit are jellies and preserves, whose flavors vary according to the apple used.

If still further variation in flavor is desired, it may be obtained by the addition of other fruit juices or flavoring compounds; and what nicer accompaniment to hot biscuit, griddle cakes, waffles, etc., and also what more appetizing accessory to the school lunch or picnic basket. In crystallized form it makes a nice addition to the bon-bon box. Apple juice appears for table and cooking purposes in the form of cider, and vinegar, and in this connection it is gratifying to note that since the enforcement of the pure food law we can obtain these articles unadulterated. Of course, everybody enjoys cider as a beverage. Cider also is a very necessary ingredient in making the best quality of mince meat and apple butter.

For salad dressings and various sauces for fish, meats, and vegetables, some acid is desirable, and nothing is better than pure cider vinegar.

The different menus require the preparation of the apple in various ways. A delicious breakfast dish to be served with the cooked cereal, or alone, consists of the apple baked, or pared and sliced, sprinkled with fine sugar and dressed with cream.

The apple fritter, a general favorite, may be served either for breakfast, luncheon, or as an *entrée*. Fried apples served with pork chops or sausages are a suitable cold weather diet.

What cook would think of serving roast goose or a roast of pork without apples prepared in some way, usually as a sauce or baked? What can take the place of the old standard American apple pie, baked with two crusts, or the English tart, with one crust only, and that on top?

If the cook wishes to please the appetites of men, the dessert that delights the heart as well as the stomach, is a pudding, and lo! the number that can be evolved from the apple—boiled, steamed, and baked. Probably one of the simplest and easiest to make consists of bread or cracker crumbs arranged alternately with sliced apples, and seasoned with butter, sugar and spices, then baked—"Brown Betty" by name.

Then we have dried apple duff, which in pioneer days was a favorite dessert with the miners; roly-poly, boiled or steamed apple dumplings,

and the apple suet pudding, which should find a place on our menu oftener than it does during the cold weather. Puddings made of cornmeal and apples, rice, tapioca, or sago and apples, with various flavorings, are exceedingly nutritious and at the same time inexpensive.

As for cakes, we have the well-known Dutch apple cake; also the farmers' fruit cake, which has for one of its main ingredients, dried apples, and is a good substitute for the more expensive fruit cake.

A preparation of grated apples, egg, and flavoring makes a most delicious filling for layer cakes. With apples, a splendid short cake can also be made. It is only of late years that the apple has been used to any extent in the making of salads; combined with nuts and celery in various proportions and served with the usual dressings, it has become very popular.

With this brief outline and considering the occasion, further detail is deemed unnecessary. Suffice it to say, however, that the various recipes for this fruit are so numerous that it could appear on our menu in a new form each day throughout the year. (Applause.)

PRESIDENT JEFFREY. Is there any discussion at this time on Mrs. Rodgers' paper?

MR. DARGITZ. Mr. Chairman, just one word. As a physician, I used to wonder just what made people say that apples were golden in the morning, silver at noon and lead at night. It has been my practice all my life, when I could get good apples, to eat two or three apples every night before I went to bed, and they never hurt me. You can look at me if you want proof.

PRESIDENT JEFFREY. Now, we have apples in southern California. Perhaps some of you are not aware that we have one of the largest orchards in the State there. We will hear from Mr. Frederick Maskew, the Assistant Superintendent of the State Insectary, who is next on the program with a paper on "The Apple in Southern California." (Applause.)

THE APPLE IN SOUTHERN CALIFORNIA.

By Frederick Maskew, Long Beach.

Mr. Chairman, Ladies and Gentlemen: As the program sets forth, I am to talk to you about the apple in southern California. To the best of my knowledge and individual experience, the apple proceeds along about the same lines in the direction of its final resting place in southern California as elsewhere, to wit: pies, sauces, dumplings, dessert, and many other of those delectable delicacies that Mrs. Rodgers has just told you about.

Southern Californians may be orange growers, but they are apple eaters, and possess in a marked degree that fondness for good apples which is characteristic of the entire American people. I am telling this for the benefit of the visitors who are present. The apple growers of this valley, judging from the amount of fruit they send down each season, know that their apples meet with the same royal reception in southern California as elsewhere.

What I had in mind when I prepared this paper was the apple orchards of Los Angeles County. Of these, their history and behavior,

I have accurate, first-hand knowledge, and I had thought perhaps a relation of the lessons drawn from an extensive study of the conditions obtaining there might prove of value to prospective planters of commercial apple orchards, desirous of extending the industry into new and untried regions.

I have attempted to confine my statements to-day to a few of the fundamental principles underlying successful apple orcharding in any country, preferring to leave the details to some more able pen than mine.

With a very few exceptions, the older apple orchards of Los Angeles County, ranging in extent from 1 to 10 acres, are merely an incident to the general business of agriculture, and as such have passed through all the vicissitudes common to such an arrangement. A careful study of these orchards shows clearly that the conditions found there are by no means due to fundamental causes, such as soil, moisture, or climate; they are simply the logical accompaniments of lack of knowledge of suitable varieties and poor methods of management. Especially is this so in the selection of varieties.

The condition of most of the fruit found in the earlier planted orchards was due entirely to lack of this knowledge of varieties suited to the local environment. The soil was suited to the requirements of apple trees. Governed by this fact, the planters of these orchards, without any local precedent to guide them, selected the varieties from the knowledge they possessed of their behavior in other parts of the country, failing to recognize the truth of the fact that rarely indeed does a variety maintain for itself the excellence that has gained for it a reputation when removed from the immediate locality in which it first attracted attention. The result of this was, that while the trees made all the growth desirable, the size, shape, color, flavor, quality, habit of bearing, and time of ripening of the fruit by the most of the varieties planted, was so modified as to be in some instances almost unrecognizable. One of our best pomologists has set forth the axiom that specialization in varieties can never precede; it must always follow the extension of horticultural centers. Yet it is fully recognized that specialization in varieties is the custom of the period, and to it can be traced the reputation and financial success of the famous apple-growing sections of the world.

A full realization of the truth of these two fundamentals is what makes it so difficult to furnish reliable suggestions in relation to the varieties suited to new territories. Apple trees will grow and thrive in a great variety of soils; in fact, the apple is preëminently the fruit of the masses, and in consonance with this Nature has endowed the apple tree with a greater power of adaptability than that of any other fruit tree known to horticulture. Notwithstanding all this, those desirous of extending the industry—and they are legion—must keep in mind the fact that it is the quality of the fruit more than the growth of the tree that makes the reputation of the locality and the fortune of the planter. The best we can do on this point is to generalize, and at the same time emphasize the point that those desirous of planting commercial apple orchards in untried regions should take pains to thoroughly familiarize themselves with the behavior of the varieties growing in apple sections having climatic conditions similar to the one in which they propose to

plant, both through their own observation and extensive consultation with successful orchardists.

There is no feature of commercial apple orcharding that should be given more serious consideration than the selection of the permanent varieties.

One of the most prominent features in these orchards that have been under consideration in this paper was their tendency to produce large crops of fruit. In many of them there were almost as many different varieties as there were individual trees. Still the full-bearing habit was universal. Out of this infinity of varieties came two that were paramount to all others, the White Winter Pearmain and the Yellow Bellefleur. These, in common with the others, produced good full crops of fruit, and the fruit possessed a good market value. Close observers soon commenced to realize that these varieties could be grown at a profit, and with a view to enhancing these profits commenced to plant out orchards composed entirely of one or the other of these two varieties, especially was this so of the White Winter Pearmain.

Thus commenced what may be considered the second period of apple orcharding in that region. The young trees in these orchards grew with all the customary vigor of the White Winter Pearmain, but they failed to set a crop of fruit. Season after season, when the Pearmain trees in the older orchards of mixed varieties were breaking down under their load of fruit, the younger orchards set in solid blocks of one variety were not producing a box to the tree.

I have in mind a number of these orchards and their owners, with both of which I was intimately acquainted at that time. Without taking up your time in going into details, I will state that these conditions brought those who were vitally interested in this matter face to face with the question of cross-pollination and its bearing upon the production of fruit in commercial apple orchards.

The many influences that enter into the normal failure of the fruit blossoms to set, such as heavy wood growth in the young trees, the attack of insects and fungi on the blossoms, frost, rain, and other unfavorable weather during blooming season were all given careful consideration during the investigation that was made of this problem by a numbers of the leading apple growers of that section. Many arguments, many of them very ingenious, were made pro and con as to the value or even the desirability of cross-pollination. It was, however, clearly recognized that self-sterility is not a constant character with any variety. The same variety may be self-sterile in one place and nearly self-fertile in another. The adaptation of a variety to soil and climate has much to do with its self-fertility. It would be fallacious to attempt to separate apple trees into two definite classes, the self-fertile and the self-sterile. All this goes to show that the problem is as much a study of conditions as of varieties, and that we can never be perfectly sure that any variety will be self-fertile in a new region. Planting for cross-pollination purposes as a matter of insurance in fruit production is now becoming a general orchard practice.

The practical bearing of the problem is this. There are certain varieties of apples that, due to their profitableness, we wish to grow largely for the general market, but we find that they can not be depended upon to produce full crops when planted alone. They need the pollen of

other varieties to make them fruitful. Then we must plant other varieties near them as pollinizers.

Having determined upon the variety to be grown for a general crop, the most important point in the selection of the pollinizer is that the two shall blossom at the same time. The only way in which a pollinizer can be of service in promoting fruitfulness in the variety planted for the general crop is by supplying it with pollen. This means that the pistils of one variety must be ready to receive the pollen when the stamens of the other are ripe; this is only possible when both varieties bloom simultaneously.

The comparative blooming of varieties is something of a local problem. Difference of location, altitude, soil and weather, govern the time of appearance of the blossoms, but a series of observations made by the writer tends to show that while the date of blossoming may be hastened or retarded by local conditions, the comparative time is approximately the same for different varieties in localities having similar conditions of soil and climate.

The variety to be used as a pollinizer is, of course, governed by the variety to be planted for the main crop. This question having been decided, the next question is to know how many trees will be necessary to pollinate the self-sterile variety. This brings us back, in so far as my knowledge extends, to the apple orchards of Los Angeles County.

Out of the failures, disappointments, and difficulties of the two periods of apple growing just described came the apple orchards of to-day. A study of these will show that the owners are beginning to pay more attention to some of the finer problems of apple culture, such as the relation of varieties to pollination, their susceptibility to disease, the individuality of trees, a better class of nursery stock, and the question of selecting the buds and scions for propagating purposes. In these young apple orchards can be seen on every hand the principles of selection, planting, and pruning advocated by Wickson, Powell, and others, applied all unconsciously, perhaps, of their origin by the workers, but in evidence, nevertheless, to the close observer.

Such an orchard is the one owned by Mr. Cudahy at Florence. Here there are 30,000 apple trees in one block. To insure fruitfulness in this orchard, one row of pollinizers was planted to each eight rows of the varieties considered best adapted to the location of market demands. The pollinizers were planted in straight rows to facilitate harvesting. Fall Pippin was used principally as a pollinizer for the White Winter Pearmain, and in some instances Yellow Newtown Pippin for the Yellow Bellefleurs. I was in this orchard about fourteen months ago, and from my own observation, as also the statements of the superintendent, this arrangement had proved satisfactory from the standpoint of the production of fruit.

In the effort made by the apple growers of the region we have been considering this afternoon to take advantage of all the lessons learned from the two preceding periods of the industry, great attention was paid to the question of the quality of nursery stock. A bud on a whole root was considered the standard of excellence, and it was soon learned that a more uniform stand of symmetrical trees could be obtained by planting those with a straight whip-like top of one year's growth than from those that had been grown the second year in nursery rows. The

conditions that resulted in this decision were found to be as follows: In well-grown one-year-old wood every eye or bud is strong and perfect, and can be depended upon to grow when the young tree is cut back to the desired height, thus insuring a sufficient number of shoots from which to select those that are to form the new and permanent head of the tree. In two years on older wood these buds have performed their proper functions in the production of either shoots or leaves and can not be depended upon to put out uniformly. It was found that trees grown the second year in nursery rows had invariably been branched too high to meet the accepted standard of height in that locality, and when these were cut back below the point at which they had been branched, they were almost invariably put out from a bud just above the ground.

In following up this matter of nursery stock further, it was found that there were still other factors to be considered. In almost every apple orchard, even in those in which the general growth had been satisfactorily and fairly uniform, there was found to be a distinct individuality in the trees of the same variety. Regular bearers, erratic bearers, shy bearers. The foliage differed, too. I have seen a Yellow Bellefleur, one out of fifty, carrying rich, green leaves throughout the season, when the foliage of the remainder was brown and withered from the attack of mildew, and this not only for one season, but for several consecutive seasons.

It was claimed at the time that these conditions were the logical results of the indiscriminate cutting of buds for propagating purposes, especially so of cutting buds and scions from nursery stock from young trees that had not had an opportunity to develop any characteristics whatever, either good, bad or indifferent.

If the laws of heredity hold good in the vegetable kingdom, and the history of horticulture will justify us in concluding that they do, the character of resistance of foliage and habits of bearing can be transmitted through the buds. It is well at this point to make the distinction between a type and a character. No amount of care in selection will transmit a type. A type is the result of environment, a character the result of heredity.

In the effort to transmit desirable characters through propagating wood, it is well to remember that the individuality of an apple tree can not be determined by the observations of a single season. It must show persistent good behavior for several seasons, and must be accurately watched and compared with other similar trees before we can obtain a correct estimate of its habits. Many causes tend to produce heavy bearing, high color, or large size for a season or two, but when a tree under average orchard conditions shows that its habits of bearing and health of foliage are stable, then there can be little question about the transmission of its characters through its buds, and the annual crop of buds from such a tree should be worth more money for propagating purposes than the market value of its fruit.

In the consummation of this ideal of having the good habits of the apple trees universal throughout the orchard the initial step must be taken by the planter. He must create the demand for pedigreed stock and must be prepared to pay accordingly. A propagator of apple trees can cut 1,000 buds in the nursery rows in less time that he can ten from

an individual tree. In all lines of business, time costs money, but the cost of nursery stock, if the quality is there, should be the least of factors that enter into a long-time investment like an apple orchard.

And now, for especial benefit of those who propose to extend the apple industry into new regions, the lessons drawn from a prolonged study of the apple orchards of Los Angeles County, concerning the laying of the foundation of a commercial apple orchard, may be recapitulated as follows:

Study well the local conditions before selecting the permanent varieties.

Insure fruitfulness in large blocks of one variety of apple trees by planting pollinizers among them.

Look into the origin of the propagating wood used before buying nursery stock.

There is nothing in all of what has just been said that is new. No one knows that better than I do. In apple orcharding, as in every other phase of horticulture, the state of knowledge is far, far in advance of the state of practice. These truths have been set forth time and time again by such masters of the science as Waite, Wickson, Powell, Fletcher, and others. All the good that I could hope to come from this paper lies in the fact that the report of this convention will be widely circulated, and some future planter of a commercial apple orchard may perhaps have his memory refreshed upon these points before he plants his orchard rather than after the loss of many years and much money. (Applause.)

PRESIDENT JEFFREY. I don't feel like allowing Mr. Maskew to belittle his own achievements in this line. While he may not have told us anything new in apple growing, everything that he has told us he has lived himself. He is an apple grower and a student of apple culture, and while he may not have told us anything new, he has told us things that he has realized by actual contact with the apple trees themselves and their environment and everything connected with apple growing. We have heard a gentleman referred to rather indirectly, rather obscurely, in Mr. Maskew's paper. Now we have that gentleman here to present to you his views in person, and it is now time to introduce him. Professor Wickson will please come forward: "Must the Apple Go to the Mountain?" (Applause.)

PROFESSOR WICKSON. *Your Excellency, Mr. Commissioner, Ladies and Gentlemen:* I have swallowed a good deal of this December weather and am not quite sure whether I can make myself understood. However, the paper is very brief, and for that reason I will undertake to read it myself.

MUST THE APPLE GO TO THE MOUNTAIN?

By E. J. Wickson, of the University of California.

Must, or will the apple go to the mountain? I ask the question without expectation or intention of answering it. It is a very old question. Ever since the apple did so ill in the Garden of Eden, down in the rich valley, and escaped the penalty of its offense upon the summit of Mt. Ararat, mankind has been discussing the question: "At what elevation

may the apple be expected to do its best?" At this late day we could, perhaps, ignore the question were it not the fact that never before in the history of the human race has it assumed such great commercial importance as it presents to-day in this newest of all civilized lands, the Pacific coast of the United States. With us it is not merely a question of a few trees or a few hundred trees as an annex to general farming; it concerns itself with the development of important parts of states or even of whole states; of thousands of people, and of millions of dollars. Thus, a very old question now assumes such new phases that it may require years of study and experience to answer it from these new points of view.

Are elevated regions entitled to the distinction which they are now claiming as alone suited to the production of winter apples of the highest finish and beauty, and the most perfect keeping qualities, and will the fruit continue to command the lofty prices which it is now receiving after traversing a quarter to a third of the world's circumference to reach the world's great markets? This is a question involving pomology, commerce, and finance, and in the sciences and arts of these three great branches of human activity favorable demonstrations must come to justify claims which are now being made, in some parts of the coast, that a thousand dollars per acre can be supported as a reasonable valuation for good apple land and five thousand per acre is not unreasonable to claim as the value of a thrifty young bearing orchard. Will all these favorable demonstrations be attained? It would manifestly require the most piercing analytic insight and the most clear and accurate prophetic foresight to submit an answer which could be accepted as conclusive. Nevertheless, it is a question which every commercial apple grower should ponder and upon which he should watch for every ray of light which can be drawn from observation and experience. I have no thought of penetrating the depths of the problem, but rather to indicate a few features of the environment of the question by way of which, perhaps, the ultimate determination may be approached.

It must be conceded that the mountain apple is superior to the valley apple in beauty and finish, in texture and in keeping quality, when it has been well grown under conditions which enable the favoring features of the elevation to do their best work. Taking the apple to the mountain does not imply that the elevation will do the rest. Every principle of good culture and every recourse of protection must be as assiduously applied—possibly even more so—to attain the best commercial results. But this superiority of the maintain apple is not a recent discovery, nor are the conditions which impart it at all restricted to the parts of the coast which are now making greatest claims to them as a distinctive natural endowment. The grand beauty and keeping quality of California mountain apples were demonstrated very soon after the American occupation and before any commercial greatness in our fruit products was thought of. The fact was thrown in the world's eye at the Centennial Exposition in Philadelphia in 1876. A systematic demonstration was made at the New Orleans Exposition of 1885, where apples grown at elevations from two to four thousand feet in different parts of California were shown in June of the following year in competition with the fruit grown in the mountains of Arkansas and Mis-

souri and the few specimens remained in a good show condition, while the fruit upon the competing plates was replaced several times. This test was accidental, in a way, because the California exhibitor had no reserve stock to replace with and was forced to let his first specimens stand up against all comers, and their behavior was a revelation to all beholders. California made the record then for the superior quality of winter apples grown at elevations in a semiarid climate, and the question which has recently arisen as to whether California can grow as good apples as the northern states of the coast which have similar climatic characters should be reversed. Can they grow as good apples of that class as we?

On the commercial side they have passed us, and they have advantages which must not be minimized. They are entitled to credit for the grand achievements they have attained, even if the calculations they are making upon the basis of such achievements should prove exaggerated. They have decided advantages in transportation; they are almost out of sight of us in the important matter of growers' organizations for standardization and handling of fruit as applied to the apple; they are concentrating upon a single fruit and upon a very few best varieties, as we are doing with the orange, but we can not compare with their concentrated and systematic work in connection with any other fruit which we grow. We must do this with all commercial fruits if our production is to be increased. But giving them this credit and thanking them also for the confidence and buoyancy which their distinguished successes will contribute to the spirit and development of all the fruit interests of the coast, we must claim that they have demonstrated nothing distinctive in natural adaptations beyond what California elevations possess. The high valleys of Lake, Mendocino, and Humboldt comprise half a dozen districts like Hood River. The Shasta region has all the variations in altitude and exposure which has eastern Washington from Wenatchee to Walla Walla and from North Yakima to Spokane, and Mt. Shasta is higher and can shake biting breezes from his shoulders which will bring just as bright a red to the cheek of the apple and just as deep a blue to the nose of the grower as any of the northern snow-clads can produce. There are also high valleys in the central region and in the mountains of southern California, where the "warm days and cool nights," which our northern friends are claiming monopoly of, are the regular thing during the growing season and where the winter is marked by heavy rains and snow flurries which are just as cold and wet as theirs. But I fear that running along this line I am almost conceding that the apple must go to the mountain in California, as they claim elsewhere. I am not ready to do that, though I do insist if that be the ultimate decision California will still be in the apple business with two long mountain ranges and several short ones.

It is worthy of note that the present fame of Oregon and Washington in apple growing is no part of the traditionary fame of the Oregon apple which has been handed down from '49 and the spring of '50. The Oregon apple which the California pioneers worshiped and were disposed to give the horticultural birthright of California for a mess of the sauce of it, was not a mountain apple at all. It was grown in the lower levels of the Willamette Valley, and, perhaps, on the lowlands of the Puyallup and in other coast regions adjacent, and its fame came, not from comparison with either California coast or California mountain

apples, but with apples grown in the low foothills and near the rivers of the great valley where the first mines were, and where nothing but an early apple for immediate use is worth growing even to this day. When the coast apples of Oregon and California are compared, there may be no particular difference in the fruit perhaps, but California has the coast apple business developed to a volume of prime clean fruit and breadth of trade which have made the State famous, both at the East and abroad. And this California coast valley fruit will always be in demand for distinctive trade and particular markets, perhaps, providing large groups of Californians work together for the development of culture, protection, and marketing, as the people of the Pajaro Valley have done during the last decade. It is likely that they will meet new difficulties as they have met and vanquished the old ones. The new problems will probably include those of a different nature, and they may be largely pomological and commercial. I suggest a few simply to indicate my meaning.

First—The Pajaro Valley bellefleur is a demonstration that an apple which is notable everywhere for being very exacting in requirements for success does find in the Watsonville district conditions which bring the fruit to a degree of perfection which is rarely, if ever, attained elsewhere. It is altogether probable that there are other varieties which will exhibit similar content and display other characters and commercial suitability and attractiveness. The value of the bellefleur was, I presume, demonstrated through the chance planting of it by the pioneer orchardists of the valley. There should be provided in the valley a means for testing out all old varieties which have not been tried, and all promising varieties under competent pomological observation and comparison.

Second—There are other varieties which attain acceptable characters and local desirability in the main, but disclose some defects which limit their value. This may be due to some requirement for full development which the local conditions do not include or to some peculiar behavior of the type which has been thus far prevalent. In either case, the effort to retain the variety but to find a more suitable type should be systematically made. This, too, is a matter for close pomological study and comparison, and it is analogous to the effort which is being made in southern California for the discovery or development of superior types of the Navel orange.

Third—There should be close study made of the relative effects of all cultural operations and all treatments for prevalent pests and diseases upon the thrift of the tree or upon the duration of its effective growing period, or to discover unforseen influences which any cultural or protective policy may exert upon the character of the fruit. Some very startling claims in this line have been recently made in distant places. Whether they are true or not they furnish a suggestion that all cultural operations might be looked into lest they might have some relations to obscure defects of various kinds.

It is not necessary to multiply suggestions of this kind. They are not new. They have been freely discussed by Watsonville growers, both individually and in the Orchardists' Association, and are, I believe, generally approved. I mention them for two purposes: first, to add what emphasis I can to the importance of the work; second,

to assure you that such work commands the keenest interest among the pomologists of the University, and they are eager to coöperate with the growers and with the competent men whom the counties of Santa Cruz and Monterey have already in joint service for the promotion of the apple industry. It is, however, really a State service and should be provided for by the legislature as such. To attain results this work should be amply provided for through a period of many years. Probably your two counties and your liberal individuals and associations have done more for the protection of the apple than all the rest of the State combined, and all the State has benefited by your work. It is time the State took up apple work as a special effort in its own behalf, and this convention should express itself clearly in this line.

As to my first question, then, "Must the apple go to the Mountain?" although I disclaim the ability to finally answer it, I expect a negative reply for these reasons:

First—Though some apples may have to go to considerable elevations for the best development, other apples both for pomological and commercial development must be grown under the distinctive advantages of the coast valleys. All apple literature and all common experience show that different varieties of apples require different conditions for their best development and the trade requires that such special adaptation be discovered and regulate the activities of planters. There is every reason, therefore, to think that there may be apples of every season of ripening which suit our valleys better than higher elevations anywhere.

Second—The present disposition of apple planters is to grow long-keeping winter varieties to secure the manifest advantages of such fruit for long distance marketing. This special attention to one phase of apple growing should convey the suggestion that more should be done to develop markets for summer, fall and early winter varieties for all of which California has distinctively adapted districts and can market such fruit everywhere west of the Rocky Mountains and south of the Arctic Circle, while locally grown apples over this vast area are still in the bullet or baseball phases of growth. This is a field of production which must be distributed through the interior valley and foothills and the coast valleys, according to the special growing conditions which are found in each of these situations. Every advance in the settlement and development of the wintry districts of the Pacific Slope opens wider the avenues for the employment of the unique advantages of early growth which a relatively small area of the slope possesses.

Third—Not only the nearer markets, which are thus expanding, but the more distant countries around the Pacific border, and especially, perhaps, those southern regions which will come into neighborly relations with us through the Panama Canal, and along all the currents of transportation which it will set in motion there will be new demands for apples during all the months before the latest keepers mature. This is a field in which there will be practically no competition with California valleys, and no matter what is done with winter apples here or elsewhere, this opportunity will remain open to us. (Applause.)

PRESIDENT JEFFREY. We have some time now for discussion. There has been considerable said this afternoon about type, about standardizing apple trees or getting pedigree stock. If that is good doctrine

to preach in the apple industry, it is also good in other industries. I would like to have some discussion on that one point, and I would like for Mr. John Markley to come forward and say a few words, if he will, on that point. Mr. Markley is one of the old members of this convention. He was active twenty-five years ago in the work and is active now. I have the pleasure of introducing to you Mr. Markley.

MR. MARKLEY. *Ladies and Gentlemen:* I am afraid I have got myself into a position where I can't do you any good. The horticultural commissioners the other day held a meeting up in my neighborhood, in Sutter County, and, more to fill up than anything else, we brought up the question of the advantages of pedigreed stock, and I gave my personal experiences in pedigreed stock. I said that I found when I went to the race course I was considered a fool if I bet on anything in a trotting race without it had a pedigree; that when a man went to raise hogs he first had a pedigree; in the dairy business was first a pedigree and then the individual animal. In Sonoma County I had a prune orchard and there was one spot of very rich land overflowed with sand which gave it a fine mulch. There were over 100 trees there which would bear from 200 to 400 pounds apiece. There was one tree on the ranch—I had 12,000 trees—that from which for thirteen years I never picked more than 20 pounds a year, whilst others bore all the time. The boys on the ranch called it the bastard. I examined the orchard pretty carefully and I found that I had a great many bastards. After awhile, looking around on the other side, I found I had a few trees and they grew of different shape from the others and bore wonderful crops of prunes. I kept a record of these trees for four years, and if all my orchard had borne as those did I would have had about double the quantity of fruit. The application I wanted to make was, where I live we raise a great many Thompson's Seedless grapes and they are shy bearers sometimes, or very erratic in bearing. About three years ago a man in great pride showed me a vine that had a great many grapes on it, and I kept on looking and he said, "What are you looking for?" I said, "I find nine vines here. Either one of these has as much vigor as this one that has a crop on it and if these vines all over the vineyard had as much on it would make you rich." He said, "I am afraid it might bear them to death." I said, "I don't think it will, but if it does you can afford to let them die." Mr. Frank Swett told me that prior to picking the grapes in his vineyard he went up there with a brush and a paint pot and marked the vines with a stroke up and down that had a large crop on them and the next year he did the same thing and the next year again, just before the picking. He says, "Whenever I have a vine with three marks on it I know it has borne a heavy crop three years in succession. My vineyard will average about six tons and these pedigreed vines about ten." That makes quite a difference. I went there to buy cuttings. He says, "Oh, I have sold all the cuttings." I was buying cuttings for two dollars a thousand; I went there to pay him ten dollars a thousand for his pedigreed cuttings, but I could not get them. He had sold out. I believe it is very beneficial, and I believe that if somebody in this State would start a nursery and grow pedigreed stock and guarantee it, it would do the State a great good; and I

don't know why they could not grow pedigreed stock as well as anything else. That is about all I have to say.

PRESIDENT JEFFREY. How are you going to get the vast majority of tree planters to pay the price?

MR. MARKLEY. I don't think it would cost much more. I have sold trees a little, and I don't know why it would cost me any more to raise a tree from a pedigreed tree than any other.

PRESIDENT JEFFREY. A nurseryman must be paid a price for that skill. How are you going to get the average grower to support him in that work?

MR. MARKLEY. The average fruit-grower is as intelligent as the average horse-grower. They have been educated up to that. I believe you could educate them up to it. (Applause.)

MR. DARGITZ. Mr. Chairman, I believe that I would like to add a point toward the question that the Chairman has just raised about the expense of getting pedigreed stock in this way. I think the customary price for budding that nurserymen pay the orchardists who cut them for them is something like $2.50 for a thousand buds. Take it for granted that the thousand buds will produce 500 trees—I think it ought to do that—that makes about one half cent per tree per bud. Suppose that for these pedigreed buds the nurseryman had to pay ten dollars per thousand buds; I think he could get them for that, and on the same ratio of production it would make the buds for his trees cost two cents per tree instead of one half cent. The added expense, therefore, is only one and one half cents per tree, and if there is any nurseryman that can't stand an average of one and one half cents for producing trees that will outrank all other nursery trees produced, let him add a cent and a half or even three cents to the price of his trees, and he will have no trouble to sell them, providing he can convince the buyer that he is giving him just this kind of stock. It is a fact that can not be successfully disputed that in any orchard and any variety of trees, with the same care, from the same nursery and the same time of budding and all, there will be a difference among those trees in the productiveness. There will be also a difference in the quality of the fruit. You will find trees here and there in the orchard that will produce more fruit and better fruit than their neighbors, the other trees alongside of them that have had an equally good chance. Now then, if we want to bring up the productiveness of our orchards, doesn't it stand to reason that those trees should be marked just as indicated and that the buds for propagation should be taken from those identical marked trees? If we will do that we will build up the productiveness of our orchards. The same principle prevails exactly that prevails among animals, and where is the man who is going into the stock business to grow cattle or horses or hogs or sheep, if he followed out the hit-and-miss, haphazard manner of selecting his breeding stock that we follow in selecting our stock in planting orchards, would not come to grief very promptly? If he did not he would deserve to. There is no opportunity for success in the stock business unless a man uses exceedingly great care in the selection of his breeders, and there is no reason why we should expect great results, satisfactory results in the development of our orchards and the productiveness of our orchards unless we use the same good common sense in the selection of the buds for the propagation

of our trees. It is a point that needs emphasis, and it must have it. (Applause.)

PRESIDENT JEFFREY. I would like to call Mr. Dargitz' attention to the fact that he only spoke of the grafting or budding of the trees. In propagating pedigreed stock you should, perhaps, pay as much attention to the root part of the proposition as to the scion or bud, consequently it would add more than three cents to the expense. Most nurserymen make an ordinary length of seedling root to produce three or four roots for grafting. It is much more expensive to produce a tree on a whole root, which ought to be done if you are going to put a pedigreed top on it. Another thing, the nurseryman, if you deal with a nurseryman, ought to be well paid for the honesty and skill in producing a pedigreed tree, because he is giving you a start that even your grandchildren may enjoy in gathering the fruit from those trees.

MR. DARGITZ. Mr. Chairman, I don't believe that any nurseryman in the State of California would want to come out and openly announce to the public that he was progagating trees, pedigreed or otherwise, from piece roots. I think he would like to have it understood that he is using whole roots and the best roots.

MR. HICKMAN. I would like to say that pedigreed stock is a great thing in every industry, whether it be stock raising or what not. But there is another feature, the place to put the pedigreed stock, which, according to my observation, is very sadly neglected. I can show you, almost within sight of this very building, places where thousands of good trees have been thrown away, simply by planting where they never should have been planted; places that are noted as raising very fine fruit have thrown away something more than half their capital—very much more, and even after the trees are planted, the care they receive is not "pedigreed" care. Even the best of pedigreed stock will starve to death; and, though I am not a horticultural commissioner at present, I may be some time, and I think it should be one of the duties of a horticultural commissioner to protect, so far as it lies in his power, the tree planter from his own ignorance. I have been just as ignorant as others in this. I have paid dearly for my experience. I know what it means to have pedigreed stock. I have seen Newtown trees producing four or five boxes of choice fruit and right beside them trees that would produce ten boxes of worthless fruit, year after year, and, as far as it laid in my power, I have made the changes and used pedigreed scions and so on. But going right through the same orchard, I find there are other conditions besides the pedigree or the stock or the scion that cut fully as great a figure. A year ago we had a very heavy rainstorm, and I, in common with most other unprepared orchardists, found a great many gullies washed in my orchard, and here and there were little ridges of rock, which showed that there were basins that needed draining. I was wondering for some time why certain trees did practically nothing. I can show you trees within fifty feet of each other on the same hill slope, every other condition apparently identical—the trees were identical when taken from the nursery row—and within three years' time one tree is ten times as large as another, not only in one place but in dozens. It is a hill orchard and in sandy land. These are conditions worth looking into, and it seems to me they should be emphasized in the reports of our conventions.

PRESIDENT JEFFREY. What if we could estimate in dollars and cents the millions that have been lost in California by planting poorly pedigreed stock? You would find that the amount of money made altogether in fruit growing has not been nearly as much as the loss in planting in this manner. About 110 years ago a remarkable horse came into Vermont, afterward known as Justin Morgan. For years and years the strain was kept pure, and then it was neglected for fifty or seventy-five years. Now both the United States Government and the State of New York are spending thousands of dollars to restore the purity of the Morgan blood. That ought to be done with horticultural products. If we have a Spitzenburg, let us keep it pure. If we have a bellflower, let us keep it from turning into a grindstone; let us keep it elongated. It ought to be one of the duties of this convention, and every other fruit-growers' convention, to encourage a few nurserymen who are willing to put their capital into this business to raise trees, and instead of paying 15 to 20 cents for a deciduous tree, pays 35 cents for it, and it will be like getting money from home when the orchards come to bear.

MR. BERWICK. Regarding that first paper, you were this morning deploring the misleading statements that go out from California regarding our orchards and vineyards. If I remember rightly, that paper speaks of a very encouraging price of three dollars per box, f. o. b. I don't know if any Watsonville grower expects or gets three dollars a box, f. o. b., or if there be an Oregon grower here who gets, on an average, one season with another, three dollars a box, f. o. b. I think we would like to hear from him. I would like to ask Mr. Rodgers or Mr. Judd what is the average f. o. b. price in Watsonville? Does it approach anything near three dollars a box?

MR. RODGERS. An average would be 90 cents to one dollar a box.

MR. BERWICK. Every season?

MR. RODGERS. Yes, sir. Sometimes it averages 10 or 15 cents more, sometimes a little less, depending on the world's supply.

MR. BERWICK. I believe the price this season in Covent Garden is $2.05 a box—I got a telegram a few days ago. I don't see how they can get three dollars in Oregon when they are sold in Covent Garden for $2.05. There is another point, referring to Professor Wickson's paper. He says, "Will the apple go to the Mountain?" When I think of the Pajaro Valley and the Santa Cruz Mountains I don't think the Pajaro Valley apple will go to the mountain. I have been on the mountains, and I don't even find the Santa Clara prune going to the mountains and making anything but bankruptcy for the growers. (Applause.)

MR. RIXFORD. I would like to ask a question. This discussion has been exceedingly interesting, and I would like to know if there is any one present that can tell us anything about the influence of the stock on the grafting of these pedigreed trees?

PRESIDENT JEFFREY. I can answer very easily, because I am in a position to call out any one to respond. Mr. Femmons is called on for that answer.

MR. FEMMONS. I can't answer from any scientific standpoint, nor can I answer from any economic standpoint; I can only answer from the standpoint of actual observation in the orchard; that is where

I get it from him. In grapevines, strawberries, berries of all kinds, small fruits, we can keep up a pedigreed stock almost absolutely. There are little influences quite frequently that we can not quite overcome, but when it comes to grafting or budding orange trees, for example, there are problems or influences coming in to contend with that are almost insurmountable. Sometimes we will succeed. At other times, under apparently the same identical conditions, as far as we can see, we will fail; why, I am not going to answer. I can give you an illustration. I have done a good deal of top-grafting in my orchard. I started out, away up in the mountains, to try and demonstrate the apples that would succeed there in that location best. I made many mistakes, like a great many other people, and I found it out, but by experimenting I found apples that pleased me, and my idea was, those trees that did not please me, did not produce fruit to satisfy me, to top-graft them, and I chose a few, and my grafting has been by carefully selecting the scions from the trees that pleased me most, that bore the finest fruit, made the finest crops. That far we can go, and when you come to put them into the other stocks, whether it is a small nursery stock or in a bearing tree, we scarcely know what we are going to get, that is, for quality. It is claimed that the stock does not influence the scion to any great extent, but in many cases I know it influences the scion to a very great extent. For instance, I have a neighbor living within three or four miles of me who had one of the earliest orchards in that northern region, early in the sixties. At that time our nurseries had almost every variety that you could get, and, as it happened, there were a great many of the old grindstones planted in that orchard, the American Pippin. After they were thirty years old it was found they were of no value, and he happened to find a very fine strain of the Ben Davis apple. It pleased him—and, by the way, the Ben Davis can grow up in those mountains to perfection. He got some scions and had his trees top-grafted. When they came into bearing they were neither grindstone nor Ben Davis nor anything else; they were a complete blending all over, with the prominent bright stripe of the Ben Davis; they were only medium in size and were perfectly worthless. That was the best illustration of that one thing that I have seen. How we are going to overcome those things I don't know, I don't propose to answer. We have got to contend with those outside influences, and how they come in I leave it to your scientific friends to find out. (Applause.)

MR. NEWCOMB. Mr. Chairman, I would like to say just a word in defense of the Oregon apple grower and the prices they are obtaining. Last year the apple growers at Hood River marketed 300 cars of apples. There were 75 cars, or 25 per cent, that brought these fancy prices—$2.25, $1.75, and $1.50. Mind you, they were the very cream of the crop. We only hear of the best. Portland got all of their inferior apples; they use that for a dumping ground; but by careful selection they do obtain these prices.

MR. HOTLE. The firm of Hunt, Hatch & Co. of San Francisco bought one carload of their fancy apples; they paid $2.25 f. o. b. there, but, as Mr. Newcomb says, they were the best.

PRESIDENT JEFFREY. The average Hood River apple this year brought from $1.45 to $2.15 up to $2.25 per box. I never knew the Ben Davis grew to perfection anywhere, but I will take Mr. Femmons'

word for that. Now, with regard to the discussion of stock, that is the most profitable thing we have undertaken here. The presumption is in favor of Mr. Femmons' idea that the root of the tree has very little influence on the quality.

MR. FEMMONS. Often, not always.

PRESIDENT JEFFREY. How can we keep the purity if the root of the apple tree had a very serious influence on the fruit? We would not have any Spitzenburgs for 115 years; the Northern Spy would not retain its individuality, and the Newtown Pippin would not retain its individuality. But the root of an apple tree, of course, or any other tree, will have a great influence on the pedigree and bearing qualities and the appearance of the ripening fruit itself. I don't think it has a great deal of influence on the inherent qualities of the fruit that have been stamped into that Spitzenburg apple over in the old countries, for instance, for hundreds of ages. We don't know how it got there any more than we know how the best horse ever raised on earth appeared in Vermont, how the navel orange ever came to perfection away down in Brazil without anybody knowing where it originated, and I don't believe our scientific men will ever find out, but we ought to bring our discussion to bear upon dragooning some half dozen nurserymen to raise pedigreed trees. In Oregon I have seen the growers in the Rogue River country amputate an apple tree, a Ben Davis, about six inches in diameter, which some of the older orchards had matured, and at the next station above Medford, put in a little scion about as big as your finger, cover it with wax, and in three or four years that was an apple tree as perfect as ever grown from a nursery tree. There is a place where the ability to build up apple trees is certainly remarkable. You could not do that in Los Angeles County; you might in this county, but the Rogue River people and the Hood River people should not have the credit that we get down here, because nature does many things there it does not here. One thing is, it gives them a regular supply of moisture and it throws the leaves off at the proper time, and makes them stay off until the proper time in the spring. You never see apple trees in bloom in the winter, and all those things make it a typical apple country, similar to this section.

MR. MASKEW. I have been trying to make progress along these lines for a great many years. The consensus of opinion seems to be this afternoon that pedigreed stock is desirable. The consensus of opinion seems also to be that it must start with the nurseryman. These are nearly all apple growers here, and I would like to ask, if a man to-morrow desired to purchase from you pedigreed stock, is there a man in this audience would give him a guaranteed pedigree?

MR. FEMMONS. Yes.

MR. BERWICK. What do you call a guaranteed pedigree?

MR. MASKEW. A record of the bearing ability and the fertility for a period of, say, four years—longer, if possible—a record of what that tree had produced and a record of its character. Could any man furnish that and say, "I have got a record of it for four years. This tree has done so and so for four years." How is the nurseryman going to commence this if we don't have the tree for him to draw upon? I have tried to do this for years, and in a small way I have satisfied myself it can be done. To begin with, we must have the trees to get

the buds from. Now, Mr. Chairman, if you can devise a ways and means of starting this, it will be a step in advance. We talk this over all the time and every year we have no trees to get them from.

MR. BERWICK. Mr. Chairman, I want to answer that challenge more or less. I have a pear tree over fifty years old, a Winter Nelis pear tree. That tree has averaged half a ton of pears every year for the last fifteen years. I will take $50 a thousand for buds off that tree.

MR. MASKEW. Now, who has a pippin or a bellflower that he can give a pedigree on?

MR. FEMMONS. As I said in my first remarks, and I would like to make it a little more explicit, in answering the question whether I could give the pedigree of stock—and it would be apple stock—I could not give the annual yield, but it is this way. For instance, within the last ten years I have grafted over a hundred trees in my orchard to what is known as the Delicious, and if you will just excuse me one moment I want to make this addition to what I said a moment ago. Many varieties of apples are susceptible of influence from a stock. There are many other varieties that show but very little influence at any time. There are a few varieties, though, that I am sure are very susceptible to it. Now, to come back. I have grafted there a hundred trees to the Delicious. That stock I had from the original tree that grew near Des Moines, in Iowa, and I have grafted every one of my trees from the original tree that I grew at home, which I consider yet to be about as fine as any that I have ever seen. From that one tree I have propagated over a hundred trees. A few out of that hundred, for the past four or five years that I have been watching them, certainly grew superior fruit even to my own original tree. They are brighter in color, they are better in form, they are certainly more juicy and are a finer apple in every way—a few of them there. The most of those trees I can scarcely discover any change in any of their characteristics and yet every tree has its individuality. You can see it in growth, in form of fruit, its character in every way, just as I would come up to any of you and see the character in your face. You can go up to your trees and make neighbors of them, as every one should, take them into your arms, talk to them—well, I got off my subject. Some of those trees propagated from my original Delicious tree are dull in color, they are very elongated, they are poor in quality. The tree the stock was put on seems to be just as vigorous, just as full of life, and why there is that difference I can't tell. That is what I want to get at. As far as nurserymen are concerned, a good conscientious nurseryman that will use every endeavor to propagate the best trees ought to have a dollar for every tree he propagates, and no one ought to begrudge double, treble—aye, ten times the price the nurserymen are getting to-day. It is money in your pocket, and it is the only salvation for California fruit growers, to get down to the very best stock, of every variety, of every kind of fruit that is grown here. With that there can be no possible end to the development.

MR. RIXFORD. Before the gentleman sits down I want to ask him if these young trees that he worked from were all of the same variety—I mean the stocks.

MR. FEMMONS. They were different varieties, some of them York Imperial, and different varieties.

MR. HICKMAN. There are so many problems that the whole session might well be taken up with the consideration of this alone. Mr. Jeffrey mentioned the Northern Spy a while ago and called to mind a row of Northern Spy I have. They have reached their majority. They are twenty-one years old, and no two show the same characteristics. But every year some branches of one or two trees will bear profusely, the other branches will bear nothing. This year there were scattered apples all through and one limb was breaking with apples, and fine Northern Spys, too. And all around the city are such kind of trees as the old gardeners knew. For instance, the Black Detroit is one that is so changed, the Ben Davis, the Baldwin, the White Winter Pearmain and the Bellflower. With the exception of two White Pearmain trees, all the other White Pearmain trees are overladen every year with apples, have to be thinned very greatly. Why those Northern Spys should produce so little fruit is one of the problems that I can't perceive any cause for, because the other trees in the vicinity, none of them, are troubled in that way. Sundry limbs from year to year bore profusely to the point of breaking.

MR. BERWICK. I want to make a confession, gentlemen. I told you the truth but not the whole truth about the Oregon apples. They do fetch a very great price up there sometimes. I was in Covent Garden, London, about five years ago, in the office of Martin, Jacobs & Co., whom you may know, some of you, as being the largest salesmen there, and Mr. Jacobs was comparing for my benefit the sales of the Oregon fruit with the Pajaro Valley fruit, and it did read very much to California's disadvantage. It was a year of poor yield and poor crop in Pajaro Valley and in Monterey County generally, and the figures his clerk read me from their books ran as high as 27 shillings per box for Oregon fruit and only about 13 shillings per box for California fruit; so I believe that some years, for first-class apples, Oregon may get three dollars per box f. o. b. What I object to is that highest figure going out as though it was the average price for the Oregon apple. It is misleading to the Eastern or any other tenderfoot.

PRESIDENT JEFFREY. Is there anything further before we adjourn?

MR. BERWICK. I would like to hear from the Governor. (Applause.)

GOVERNOR GILLETT. I haven't anything more to say than I said this morning, except that I have been exceedingly interested in what I have heard discussed this afternoon. I wish that I could remain with you during the whole convention. It is just such conventions as these that are important to the fruit interests of California, and I know that when men engaged in the business, like you are, meet and discuss these matters, it is going to be for the benefit of the entire State. I thank you for the reception you have given me to-day and regret that I have got to leave to-night, and I wish for this convention every success, and for all others that follow hereafter. It is the growth of our State we are after, the development of our valleys, the increase of our population, and it is the growing of fruit at good prices that is going to cause the prosperity we desire. (Applause.)

A recess was here taken until 8 o'clock P. M.

EVENING SESSION.

PRESIDENT JEFFREY. The first item of the program to-night is the "New Horticultural Law." I will not speak to you very long because I occupied three quarters of an hour of your time to-day, but in order to follow up later in the evening with some very strong expressions on the new horticultural law, it might be profitable to give a little review of this enactment as it now stands on our statute books.

About five or six years ago, perhaps, at the Santa Rosa convention, there seemed to be a desire to reform the county horticultural law. This law, as you all understand, the old law and the new, are optional laws. The plan can not be adopted in any county without the initiative of twenty-five freeholders and fruit growers. At the Santa Rosa convention it was discussed and at every convention following until the present. At one of these conventions, the one preceding the one at Hanford, a committee of fruit growers and commissioners was appointed to recommend a new law. This new law was formulated and presented at the Hanford convention, that is, the convention that was held three years ago, just preceding the assembling of the legislature of 1907. The bill was presented to the proper committees, it was passed through the senate without any opposition and brought to the second reading in the other house. There was supposed to be no opposition to what the fruit growers had prepared when, very suddenly, a telegram came to perhaps the leader on the floor in the assembly to kill this law. I believe it took nine votes to do it, if I remember, the way they had noses counted; at any rate, this single telegram killed the law, as the saying is, as dead as a door nail. The result was that our lower house of the legislature failed to act at all, although the bill had passed the senate, and we supposed it was what the fruit growers wanted and what they were going to get. This left the matter just as it was. By the time another year had rolled around there had been more agitation on this matter, and it resulted in the appointment at Marysville of a committee of five growers. I was authorized, that being the first convention I held, to appoint a committee of five fruit growers and those interested in horticultural matters to formulate a new law. This committee was composed of Mr. Briggs, of the State Board of Trade, of Judge Shields of Sacramento, Mr. Overall of Visalia, Mr. Mills of Riverside, and Mr. A. G. Kendall of San Bernardino, all men deeply interested. The bill was presented in due form. The committee had two meetings at Sacramento; I was made an honorary member of the committee, and we discussed all the principal points of the bill, and it was presented at the last legislature. This time the fruit growers had spoken so clearly on this matter and the reformation of the law was so necessary that there seemed to be no opposition to the law anywhere. We got the bill through the senate without any trouble—it was not in the perfect form that we wanted it, but we got it through, and it stuck in the assembly. While it was sticking in the assembly we soon found the reason. Two men came up from Los Angeles and began to count noses. I was one of the first men they visited in Sacramento, and they said they had the Governor with them, the Governor was opposed to the

amendment of the law, and we could not get ten votes in the assembly if it came to a show-down, and one of the assemblymen even threatened the support to the State Horticultural Commissioner's office if the bill was insisted upon. The gentlemen who came up from Los Angeles soon found that public sentiment was so strong against killing the bill again that while they could not possibly prevent the passage of this law, they could so modify it that it would not be acceptable to the committee of five who had formulated the bill. Without making the story any longer, the bill was passed just as Judge Shields had written it, with the exception of one clause, and that was the clause providing for a deputy or two deputy county commissioners to be appointed by the commissioner himself and providing the supervisors were willing to have deputies. Now the law states that there has to be an examination in every county, and that examination is held in the same way that a teacher's examination is held. The Governor, under the provisions of this law, appointed a commission of three examiners, of which Mr. Garey of Los Angeles, Mr. E. B. Collier of Riverside, and Mr. Carnes, of the State Insectary, are the members. This committee has held examinations in Los Angeles, San Bernardino, Riverside, and Orange counties in the south, and in Placer, Nevada, Butte, Yuba, Sutter, Kings, Tulare, and Fresno, in the order in which I have named them, making twelve counties, or one third of the counties in the State, approximately, that now have county horticultural commissioners. These twelve examinations have been held and most of the appointments have been made, or several of them, at least; the supervisors have twenty days after the certificates of examination are received in which to make the appointments. Now they are being made in the different counties. Monday, I think, the Nevada people chose their commissioner.

This is a brief outline of the progress under this new law. It seems to be a vast improvement over the old law. There are horticultural commissioners sitting before me to-night, and whom we hope to hear from later in the evening, and fruit growers on all sides of me, who have seen the defects of the old law. I know counties in the central part of the State here which have excellent men serving as commissioners without any encouragement from the supervisors, with but little encouragement from the fruit growers, serving without pay, to protect their counties from insect pests and diseases. There are other counties in the State where men have sought the office and are holding it just for the honor of being there and having position. There are other counties in the State, especially one or two in the south, or were before they made their changes there, that are holding this office to keep the political machine intact, and so it goes all over the State. We believe now that we have got on a better plane and we will have better results under the new law which places all the responsibility in the hands of one man. In Los Angeles County Mr. Meserve, an old official who has held the office for years and a very capable man, is commissioner. They have appointed two deputy commissioners in that county. In Riverside County Mr. Cundiff has been appointed, in San Bernardino Mr. Pease, in Orange County Mr. Roy Bishop. In San Bernardino County Mr. Pease, a strong republican, an old army veteran—not an old one—has received the appointment under a democratic board of supervisors. Mr. Cundiff, I am sorry to say, is an old-time democrat. He is

appointed by the Riverside supervisors who are republican, all but one, four out of five. In Orange County Mr. Bishop told me to-day there were four republicans and one democrat on the board of supervisors. They have appointed Mr. Bishop, a democrat, because he qualified for the office. Now, a democrat can find a bug just as easily as a republican, if he knows how, and he can treat it just as vigorously as a republican, if he knows how, and *vice versa*, and we wonder now why we have stood by this old plan so long. In Los Angeles County the best commissioner the county ever had—I was one myself for six years—was Mr. John Scott, a democrat, serving under the interpretation of the old law that the board of supervisors could appoint one man. Mr. Scott served four years most acceptably and held office under a republican board of five, but that was an accident. As soon as the machine found it out they immediately read the law and saw that the supervisors were obliged to appoint three men and at that time Mr. Scott abdicated. The fruit growers are to blame for allowing this thing to go on so long. Politics ought to be kept out of the office. When I was appointed State Commissioner the understanding was that no politics should be allowed to interfere with the office in any way. The Governor and all his friends have stood by that understanding, and when I went to select my deputies I had nobody to consult but myself. The consequence is I have got four boys, Mr. Bremner, Mr. Maskew, Mr. Moulton and Mr. Carnes, who were appointed solely because of their ability.

There are some troubles coming up to-night to be discussed with regard to the new law. In Yolo County, in Sutter County and in other counties—in one county farther north—there are troubles that will have to be discussed to-night and passed upon.

Now, I am going to quit talking to you within the next minute and give you a chance to listen to Mr. Bremner and others—Mr. Moulton will talk to you—and give you a chance to discuss the troubles that are going to come up under the new law, and when we get ready to go to that point we expect to see a difference of opinion; I hope there will be, because I am not certain myself. Suppose there is only one man passes the examination, which is the case in some of the counties right close to Sacramento; one of the most able men in the county has passed the examination and no other man got through. Under the law he is obliged to be appointed. He will not agree to give up his own private business, perhaps any considerable portion of it, at least, and attend to the county's business. The question will come up whether that man should be appointed unless he will agree to make the county business paramount to his own, and I hope when we get to it we will pass our opinion on that feature of the new law. That is the only puzzling thing now before the State Commissioner. You will see that it is going to be a troublesome matter to handle. Now Mr. Bremner will address you a few moments. (Applause.)

MR. BREMNER. *Mr. Chairman, Ladies and Gentlemen of the Convention:* Perhaps there was something of a joker in this program. It may be the subject of the examination was introduced so as to bring out all the old commissioners, thinking, perhaps, I was going to tip off the examination, that I had some underground telegraphic communication with the examiners, and would tell you all about the questions. I hope I will tell you something that will be a benefit to you in taking

the examination, if you are intending to do so, and if you are not intending I hope I may say something that will induce you to take this examination in your county.

There is a reason for the committee who framed this law putting in the clause that there should be an examination that would be a test of the qualification of the men who wished to be prospective commissioners of the counties. I believe that the reason for the qualification clause lies in the commissioners, perhaps, themselves. We know that there have been cases in California where men who have been appointed by the sanction of the growers, perhaps, where they were permitted to present only a very small bill to the board of supervisors, were only allowed to spend a little time, a very few days in each month, perhaps were often asked not to present a bill at all, or were appointed under a guarantee to the board of supervisors that they would not present any bills as horticultural commissioners. Other cases have arisen where commissioners were unqualified. I recall a case where there was a public assemblage and a commissioner of that section was present and, wishing to impress the audience with his knowledge, he reached up on the wall and pulled down a large crane fly. This fly looks like a great big daddy-long-legs with wings. He dangled it in the air and said, "That is the thing that makes the Hessian fly," and he threw it on the floor. Now, of course, the Hessian fly is a very minute fly. A man who does not know the difference between a Hessian fly and a big crane fly would not make a good commissioner, and it was with this idea in view that this examining board have drawn up questions and presented them to the applicants, to draw out whether they are, by their occupation, by their study, by their experience, qualified to not only examine incoming nursery stock in regard to its cleanliness, its freedom from diseases, but also to advise growers intelligently as to the planting and care of their orchards and vineyards. The men who passed this examination prove that the examination is practical, and I think in saying this I am complimenting the Board of Horticultural Examiners, and in complimenting them I am certainly complimenting Mr. Carnes, who is most responsible, I understand, for the questions formulated. When you have considered the matter I think you will agree that the examination is practical, for in Los Angeles County eight men took the examination and five passed. Of the five who passed four of them were either commissioners or ex-commissioners and the other an inspector. In San Bernardino County the man who passed the examination was an ex-commissioner; the man in Riverside County was an ex-commissioner. I might say, also, that I do not believe that any of these commissioners who passed this examination had ever been to any agricultural college and taken a special course in pomology. They proved, however, that they had been keeping pace with the times, that they had been taking horticultural bulletins from the State University, from our own institution, and from the government, and that they had been studying these things; that they were up in the practical knowledge and in the technical knowledge that fitted them for commissioners, and I think it is a compliment to the commissioners of California when we see that these men have been reappointed to their positions. This should be a stimulus to the commissioners who have not yet taken the examinations in their counties, to rub up a little bit and take these examinations; for I believe

that any commissioner in California who has been conscientious in his work can pass these examinations as they have been given. I believe that every commissioner should take them; that every inspector should take them; and that representative growers, who have the interest of their counties at heart, should also take them. They should take the examination to see that it is practical, and that the men who pass that examination are qualified to hold the office. The inspectors should take the examination to prove to the commissioners who are going to appoint them that that they have been keeping pace with the times and that they are qualified, for it is on the inspectors of the county that the bulk of the commission work falls.

PRESIDENT JEFFREY. It has been intimated that the fruit growers of California do not understand the county horticultural law. That is a mistake in some cases. In one particular case in which I was officially concerned, after the State had spent $500 or $600 in suppressing a very bad pest in a certain orchard, a pest that scared the citrus growers all over the State nearly into spasms, and the bill had been presented to this man for the work done in suppressing the insect pest, he must have read the horticultural county commissioner law, for he discovered that in that particular county there was no horticultural law. He could buy out every man in this house, I don't care how wealthy you are, and yet he refused to pay that bill. If we had had the officials in that particular county which we will have under the new law, this man would have paid the bill, and we must get commissioners that will do thorough work. Mr. Bremner was telling about its being necessary to be thorough. You must know a bug when you see it. Now, we have Mr. Rodgers of Watsonville, who will take charge of the program for a few moments, and I hope you will support Mr. Rodgers and help him out in his part of this evening's entertainment. (Applause.)

MR. RODGERS. *Mr. Jeffrey, Ladies and Gentlemen:* In picking up the program the other day I was surprised to find my name appearing therein under this head of "Discussion of Topics of Interest to Horticultural Commissioners." A few times in years past I have received a letter from our State Commissioner asking that I contribute something toward the program and hoping that I would not refuse, as they were having difficulty in securing sufficient topics. But not so with Commissioner Jeffrey. The methods employed by him remind me of the methods pursued by an electric lineman. A short time ago I had occasion to stretch some electric wires at my place and called in the services of a lineman, and after getting the wires over the pulley, he pulled for a time without succeeding in getting them tight sufficiently to suit him and called on me and we both pulled, and with our combined strength we still were not able to get the wires sufficiently tight. He said, "Well, now I will have to go and get my come-along." That aroused my curiosity and I waited patiently until he could secure his come-along. In due time he produced it, and it was a little device which he could attach to any sized wire, and by the use of a pulley he pulled the wire until it would vibrate like a fiddle string. Now, I think our Commissioner, when he wishes to make out a program, sits in his

office in his easy chair and throws out his come-alongs, and we have to come. Now, taking the cue, I am going to call on a number of the commissioners here to-night for several topics that have been suggested. The first is the better organization of county commissioners. I am going to ask Mr. S. A. Pease of San Bernardino to address us on that topic. (Applause.)

MR. PEASE. *Mr. Chairman, Mr. Rodgers, Ladies and Gentlemen:* I think in the discussion of this subject a good way to get at it would be to go back over some of the old methods that obtained in the early years. Of course, the commission has not come to its present state of efficiency by a single jump. We have gone by slow progress, the way most good things go, and I will just quote some of the shortcomings of the commission as I found it in 1896, when I was first appointed. I had been an inspector for a time and was appointed to the office of horticultural commissioner, and I went to San Bernardino and investigated the doings that had been going on for the seven years previous to this. I found at that time, there being a three-man commission, that they had done as commissioners sometimes did in that day, had divided the county into three separate districts. They were all citrus districts. Each commissioner took his section, a third of the county. I found further that in the operation of the horticultural commission each man used a different method to accomplish his work in the county. Right to start on, that did not appear to me as very good. My idea of the work of the commission was that the commissioner should be posted on his duties and that every part of the county should have the one best method of controlling insect pests and caring for the trees. One of the methods that I found and objected to at that time was that one section of the commission was very arbitrary, and if people got in trees and plants that showed they were not well posted as a commissioner should be posted, and oftentimes, in treating trees that were shipped in, if they had some little pest on them, they treated them with such severity that it killed the trees. Of course, this brought the commission into disrepute and a great many people were against the commission. Another thing they did, they were not particular as to the time of the year. At that time the San Jose scale was pretty bad, I think the whole length of the State, on the deciduous trees, and had to be cared for. They would wait until the trees were almost ready to blossom and then would serve a notice on a man to clean up in ten days, and then perhaps they would wait a month until the trees were in full bloom and go around and find that some of the men had not sprayed their trees, and they would order a man to spray his trees with salt, lime and sulphur and kill the whole crop of fruit. There was no method. The law dictates plainly about how the work shall be done, and yet they used to order their inspectors out and inspect all the nursery stock in the country at their pleasure. If it was deciduous stock and when it was to be taken up the nurseryman would want the root inspected, they would say, "All right; we have inspected the stock once and we will do this at your expense," and charged him, instead of $2.50 a day, as the law required—charged him 40 cents an hour. Well, you can imagine the state of affairs when I went there. They had a paper that was run by an organization. It was called a political paper, and, as was frequently the case, they changed the editor of the paper, and it was customary

at that time, after they had gotten the man installed thoroughly, to wind up by saying, "Now, remember one thing; if you ever get short of news you can always jump on to the horticultural commission," and they always proceeded to do so. As matters have progressed, we have found a great many things that needed remedying; we made certain rules for our inspectors. For instance, we told the inspectors that the time to inspect is that time of the year when something is going to follow. That means that the inspector is not to go out and inspect simply for the purpose of drawing his pay, but when he inspects and finds any pest it means that some disinfectant is to follow, either spraying or fumigation. There are a great many things that affect the commission. I speak of these because the method that had been in operation before the time we went on brought the horticultural commission into disrepute. Now we try to systematize everything, and we have helps in every direction; we have the help of the University, we have the help of the State Commission, and about three years ago we applied to the Department of Agriculture, and they have sent a man who is working now in the field for the purpose of systematizing the science of fumigation in order that the work of fumigation may be perfected, that is, that we may get the very best results from fumigation. For instance, it has been customary in some portions of the south, as in our county, for part of the people to employ the county to do the work. The county will follow the methods which have been published in pamphlet form and are available to anybody. Mr. Woglum has not the wide scope of duties that the commission has, but his sole duty is to work on the science of fumigation, that is, to overcome some of the difficulties we have been having and to establish the correct dosage for the different kinds of scales. All of these things are things that a commissioner should know. This year we have been following him closely. We have marked our tents with the Wheeler system, which is the system he has been using. After the trees are marked, by looking at the figures on the tent you can find the exact number of feet over it, and then by using a tape line you get the circumference, and he has a table of figures and that gives you the exact dosage you should use. The reason why the commissioners should know these things is so they may avoid things that bring unnecessary expense to the growers, such as contract fumigation. To explain that, I will mention that in our county we have an ordinance requiring contract fumigators to take out a license to fumigate within the county, and these fumigators are obliged to make a report to the horticultural commission every month. One of the contractors has made two reports, and in this report he has put here the owner's name and the number of trees he has fumigated. Then he puts on the other side the total number of pounds of cyanide that he used in fumigating all those trees. By reducing those pounds to ounces and dividing it by the number of trees it gives the average dosage that he used on trees. The first report that he made showed that he used less than four ounces to the tree, and such men as James Mills, who is trying to do the work correctly, would use six ounces. The effect of that would be, if Mr. Woglum is correct and it takes that dosage to kill a certain kind of scale and a man attempts to kill them with one fourth of the amount, that money is practically thrown away. He leaves the bugs on every tree.

In the working of this new commission the responsibility is put on one man. That man passes an examination to show that he is qualified to do the work of the commissioner, and is held responsible, you might say, for this amount of work. It is also intended to draw the commissions closely together, and we expect the final result will be that the commissioners will all work in more unison, that everybody will use the one best method, and that they will work in conjunction with the State Commissioner of Horticulture; that is, we will be like one body and do the work with no friction or pulling apart. (Applause.)

MR. RODGERS. Mr. Hecke of Yolo County will next address you.

MR. HECKE. *Mr. Chairman, Ladies and Gentlemen:* I have not had the advantage of having been a horticultural commissioner for many years, in fact my appointment only dated from last year, yet at the same time I have attended these horticultural conventions and have followed with great interest the various things that they had to tell before we succeeded in getting our new law passed by the legislature. I think that this new law is decidedly a great advance over the old law. How it is going to work out in the different counties remains to be seen. There is no question in my mind but that in southern California it is exactly the proper thing. Whether it is going to work out to the same full advantage in the north will have to be proven later on, but I think it will.

I have made a few short notes and I would like to speak some about the way of bringing the horticultural commissioners into closer contact with the State Commission. I think that our State Horticultural Commissioner, Mr. Jeffrey, has inaugurated a very good way of bringing these together, and that is, to hold meetings in the different districts, and thus get the growers in direct contact with the State Commission. I think this is a very necessary thing to do for this reason, that so many of the fruit growers do not have the time and have not been educated to attend this State meeting, which occurs only once a year, but by the State Commissioner coming to the different fruit districts and inducing these growers to come to meetings, they will get gradually interested in our work and we can get them to study these questions to better advantage.

We have not had an examination in our county yet, but it is possible that in the next few months an examination will be held there. From what I have heard, I believe this new law provides for all contingencies, and while it does not specifically say that the wheat question shall be examined into. I presume it will be touched upon in the part which says that the horticultural commissioner shall have practical knowledge in pruning and horticultural work.

The fact that the horticultural commissioner must be a resident of the county is a good feature. I think he should be vitally interested in keeping insects or fungus pests out of the county. Furthermore, by being interested in the county, he is not only the scientific bug hunter, but he should also be the friend of the fruit growers, and in making his tours around the country he should consult with them as to the best methods of fighting the various insect pests. For instance, the spraying for peach blight or for apricot fungus, which is practically the same, must be done at the proper time of the year or the results will be very

unsatisfactory. In our northern counties the complaint is often made that the spraying is done at the wrong time of the year. Furthermore, since this new law has passed and the relief for the horticultural commissioner has been raised, it will be possible for him to come in much closer contact with the State Horticultural Commissioner. I think the county horticultural commissioner ought to be requested to make, not only a yearly report, but to make his report monthly, and the same monthly report should also be given to the supervisors of his county.

Now, another question which has been touched upon only mildly by our Chairman is the fact that in some of the counties the board of supervisors will be opposed to having a horticultural commissioner working all the time. They will claim that there are some times of the year when it is absolutely necessary that the horticultural commissioner should be at work—for instance, during the time that the orchards should be inspected for pests, or that the different nurseries will ship in their products, and I rather anticipate some difficulties; for instance, in our county, in getting the board of supervisors to let the horticultural commissioner put in all his time at the work. Now, is it practicable to appoint a fruit grower who has the interest of this industry at heart or will it be better to appoint some one else? This I would like to hear a little more about. Mr. Jeffrey mentioned Yolo County, and I do not know just exactly what he had in mind. I am from Yolo County, and I don't know how many growers there are that are going to take this examination. I am going to be one of them, for the simple reason that even if I am not appointed it will be of advantage to me to pass this examination successfully. But, on the other hand, it may be possible that outside of myself there will not be another candidate. Our county does not belong to the great horticultural districts of California, outside of the Winters district and some 600 or 700 acres around Woodland, and there is very little interest manifested in horticulture. The main occupation of our farmers is the raising of grain or dairying, the raising of alfalfa.

PRESIDENT JEFFREY. Mr. Hecke, isn't it a fact that in your county and in Tehama and all those counties the farmers are suffering from weed pests?

MR. HECKE. Yes.

PRESIDENT JEFFREY. Isn't it a fact that the horticultural commissioners are authorized to exterminate weed pests?

MR. HECKE. Yes.

PRESIDENT JEFFREY. Then why isn't your county much interested in the enforcement of the law and why should your supervisors not pay for the services of a man to exterminate weed pests as well as fruit pests? I understand there are 17,000 acres in one farm in Tehama County that has so much thistle in it they have abandoned it and can not even pasture it. Colonel Irish is interested, because he has land on the river and the seed is being thrown into it.

MR. HECKE. The Johnson grass is overrunning one very fertile district. Under this new horticultural law I understand that the horticultural commissioner will have more power than heretofore, and I think under it he will be able to compel the board of supervisors to grant the necessary aid to exterminate the weed.

PRESIDENT JEFFREY. Your county is just as much interested in the horticultural law, being an agricultural county, if you take the

weed pest into consideration, as it would be if it was purely a horticultural county.

MR. HECKE. Yes, I believe it is.

PRESIDENT JEFFREY. Then you certainly need a commissioner there to give all his time to the work the same as in any other county.

MR. HECKE. Let us suppose that there is only one candidate who presents himself for examination. Will it be possible for the board of supervisors to go outside and appoint some one else just because this one man will not be able to give his entire time to the horticultural commissionership? Suppose he has not sufficient time at the critical period to attend to it personally, but will have enough time to supervise his deputy or the inspectors; is it in the law that the horticultural commissioner will have to absolutely give every working day during the year, and perhaps his Sundays, to this particular work? I mention this because you referred to it in your address when you commenced.

PRESIDENT JEFFREY. As you seem to be asking me a question, I would like to ask you if the law requires the sheriff to work every day of the year? He is supposed to work every day in the year and transact the business that he is responsible for.

MR. HECKE. Yes.

PRESIDENT JEFFREY. If that takes 365 days, he has got to work that number of days. If it takes a hundred days he gets the same salary. The intent of the horticultural law is that the commissioner should work every day in the year when in his judgment it is necessary; and when you think there are fine orchards in the Sacramento Valley abandoned to-day because of the Johnson grass, it is time we were waking up to the horticultural commission question, exterminate all that grass and all pests, and the law intends him to judge how many days he should put in, and the supervisors should pay the bill. That is my interpretation of the law and the interpretation of men who know much more than I do.

MR. HECKE. Of course, the executive ability of the horticultural commissioners who would be able to look after the various interests counts for a great deal. This question has simply come up because there may be simply one candidate there who is ready to undertake that examination. I thank you.

MR. COSTELLO. Mr. Chairman, the gentleman asked a question, whether after he took the examination it would require an expert. I would like to answer the gentleman.

MR. HECKE. That wasn't exactly the gist of my question. I was just asking whether at a certain time, if he were not able personally to attend to the duties, he could appoint a deputy to attend to certain parts of the business, the same as when Mr. Jeffrey has to go somewhere he requests Mr. Bremner to go for him. There is a question whether a man should be appointed who can not give every day during the year to this particular work. I fully agree with you that after a man passes that examination he should be fully able to attend to this.

MR. COSTELLO. I think the law states that where the applicants take an examination, if they do not find anybody that is qualified, that passes this examination, then it reverts to the board of supervisors to appoint six *bona fide* fruit growers. Out of the six *bona fide* fruit growers they appoint one commissioner. That is the bone and sinew of the county. They trust that one commissioner, and he tries to

qualify. Now, for instance, say one man would pass and he is the only man in his county. He wants to be conscientious; he wants to make up his mind whether he would make a good commissioner or not before he takes the office. He may be a man that would harass the fruit growers, throw them into convulsions. I had the same thing this year. A man came along and struck a little insignificant fly and he telegraphed to Sacramento that the *aleyrodes* had appeared. When a commissioner takes an examination he must intend to fulfill that job that he contracts to do. He can't go around trading horses, because it will take all his time, and he will have to keep up with his job.

MR. RODGERS. Pardon me, Mr. Costello. Suppose that we carry out the program as laid out and then we will discuss these matters.

MR. HECKE. Mr. Jeffrey, wouldn't it be a good idea to discuss this question?

PRESIDENT JEFFREY. We are going to, after awhile, and then Mr. Costello and everybody else will have an opportunity.

MR. RODGERS. Mr. R. P. Cundiff, "A More Uniform System of Inspection, Particularly in Regard to Nurseries." (Applause.)

MR. CUNDIFF. *Mr. Chairman, Ladies and Gentlemen:* I was certainly very much entertained and instructed with our very splendid program this afternoon, and came here hoping that I would not be called upon to attempt to address these people upon any subject, and late this afternoon I had an intimation I would be called upon to say something in regard to this question—a more uniform system of inspection. If we consider the vast amount of damage that the horticultural and agricultural interests of this country sustain every year from insect pests and diseases, and the further fact that the transmission of nursery stock from one section to another is perhaps the greatest factor in that dissemination, I think the subject that has been assigned to me would cover a great deal more time than I would feel like giving it this evening. I do not know whether this is supposed to apply to nursery stock at its final point of destination or at the point of embarkation or where it is shipped from. However, I think that the nursery stock should be inspected carefully at both points, in the nursery or before it is shipped, and again at the final point of destination, and by the most expert men that we can get, men who are perfectly familiar with the different diseases and pests that they are liable to come in contact with in examining this stock. It is a habit or custom in this State—I believe it is not obligatory by any State law; it is simply a matter of county ordinances—that the shipments of nursery stock all over this State are usually inspected and accompanied by the horticultural officer's certificate at the point where it was examined. To reëxamine it at the point of final destination does not imply any criticism of the ability, integrity or honesty of the man who inspected it in the first place. It may be that this stock has traveled a considerable distance, consumed a considerable time, and that there were insect pests in the egg form or embryo form that it would be almost impossible for any inspector to detect, that would develop in a form that would be, perhaps, easy to detect them at the point of final destination or before they were planted out.

I think I need but refer to the fact of the benefits of careful inspec-

tion of nursery stock and the work that has been done for years by our State Commission. I think I am right in saying that not a single pest in the State of California that we have to-day has been introduced since the quarantine office was established at the port of San Francisco. Am I right in that, Mr. Jeffrey?

PRESIDENT JEFFREY. I think so.

MR. CUNDIFF. The only case is the introduction of the white fly. That, as you know, broke out three years ago in three separate places in this State, and be it said to the credit of the State Horticultural Commission that there is not a case on record in any of the works on entomology where a pest that was once established was ever eradicated in the manner that this was. I understand that the pest has been absolutely eradicated, or that they have been unable to discover any in any of those three places, Oroville, Marysville, Bakersfield. The pests we have in California were nearly all of them introduced pests—that is, I am speaking of insect pests—and quite a good many of the diseases, that came to us mostly in the form of nursery stock in the early days before there was any legislation on the subject. In fact, California is the pioneer, so far as I know, in beginning the inspection of nursery stock as a method of protecting horticultural interests. I don't think there was ever any organized system in any other State until it was inaugurated in this State. If the system that we now have could have been inaugurated thirty years before it was, perhaps four fifths—yes, I dare say, nine tenths—of the pests that are to-day costing many thousands of dollars all over this State, and especially in our citrus districts, could have been kept out of here. If one half of them could have been kept out it would have paid the expenses of the State Horticultural Commission for five hundred years, but, of course, that is past history. We try to profit by the mistakes made in the past. The pests that we have in the State were pretty well established before any horticultural law was enacted. The value of a system of inspection is that it prevents insect pests being carried in in their county shipments. The closer that is done the better it is done, the less trouble we will have from one county to another. Take the county I live in. We have other counties adjoining us. They have certain kinds of scale pests and mites that affect citrus stock that we have not in our county. We simply examine everything coming into the county, and there are certain pests that we do not allow stock to come in from sections that are liable to have those pests. Purple scale is one of the worst pests in the citrus district. We do not allow it to come into Riverside County. If stock comes in from a district known to be affected by purple scale, acting under an ordinance, we simply give the shipper twenty-four hours to remove it from the county. If at the end of that time it has not been removed from the depot or express office, we take it out and destroy it. We have in that way kept our county free. I think San Bernardino has pursued the same policy and is free from the pest, although all the counties around us have it. I might say the same of a number of other pests, they have simply been kept out by careful inspection. Many counties have pests that the adjoining county has not at all. There isn't any reason why the adjoining county should be visited by a misfortune that some other county has met. It can only be done by inspecting the nursery stock and looking carefully after it.

Speaking of the inspection of nursery stock reminds me of the subject that was very prominently before the meeting this afternoon and discussed very ably and entertainingly by so many of our growers here, and that is the standardization of fruits. The inspection of nursery stock is so closely interwoven with that subject that if we had time we would like to discuss that matter. We frequently pass nursery stock that I am ashamed to pass in our county, not only citrus but deciduous of all kinds. Unless we can find insect pests or evident disease we have to pass it, but it frequently is absolutely worthless. It comes without proper root form, gnarled, crooked, and a grower that is unfortunately enough to put that out will never reap any profit on it. I don't think it would be necessary to legislate, but I think the nurseryman and the grower could get together and that we could soon eliminate any such thing as seconds in nursery stock. A gentleman came to me a couple of weeks ago, a newcomer, and he had bought a tract of land and expected to put out a citrus orchard; I think it was something like ninety acres. He said, "I have two propositions on setting out my new purchase." He gave me the name of the nurseryman and the locality. He spoke of one which he called seconds, three quarters of an inch through at so many inches from the ground. The other was his first class and measured an inch to an inch and a quarter. The price of one was 90 cents and the other $1.25. I said, "You had better pay two dollars and get first class than take the others at nothing. When you take into consideration that it will take six to seven years to bring even the best stock into profitable bearing, it will take double that length of time to bring inferior stock, and you will never get the benefit of it. It will cost you just as much for an orchard with inferior stock." I think when we come to standardizing or improving the quality of our fruit it must start right with the nursery. I believe that is the place to start. (Applause.)

MR. RODGERS. I am going to ask Mr. Dudley Moulton, quarantine officer of our State, located at San Francisco, to address us on the better interpretation of our quarantine laws.

MR. MOULTON. I will speak for just a few minutes on what I think is the best interpretation of our quarantine laws. You understand, of course, that the object of quarantine is to keep out from the State injurious insects or pests and to keep injurious pests from being transferred from one county to the other. The work of keeping injurious forms out of California comes directly to our State quarantine office through shipments of stock from the East directly to the county commissioners, so that it very often happens that the county commissioner is to act almost as the State quarantine officer would, and for that reason it is very important that he be well informed on what insects might be introduced that would be injurious. It has been said that if a man were to begin when he was a boy and give five minutes every day and night of his life to the study of a single insect, he would die without having studied but a very small per cent of the insects that are in existence. This simply emphasizes the fact that the field of entomology is a very large one, and even when we are specially trained or give up the most of our time to entomology we can not be informed on all the insects that might be introduced, which would make it a very

hard matter for a local inspector, a county inspector, to know every insect that comes into the county. In a number of cases I think the county commissioner will find that if he does not know the insect he may find on nursery trees or fruits or cuttings, he will have to refer it, probably, to some one else. In San Francisco we find that most of our stocks of fruits and trees that we have to deal with come from across the water by boat, and they come in the shape of fruits, as pineapples and bananas shipped in crates or express shipments or in hand plants. I think, perhaps, one of the most important phases of our work in San Francisco is to watch the hand plants or small lots of fruit that come in through the passengers. As an illustration of this, about a month ago a gentleman brought in half a dozen, or quite a few—there were a dozen plants in the shipment, and on the under side of two or three of the leaves on one plant—there must have been three dozen leaves on the plant, but on the under side of two or three there was a little colony of thrips, adults, both male and female, and the larvæ, a full family. That could very easily have been passed over and it would have established itself wherever the plant went, and if it happened that the insect took more favorably to other plants, it might easily have become a serious pest. The same is true of scale insects and some of the larger insects, such as katydids or grasshoppers, that may lay their eggs inside of the plants; you may have cuttings and the eggs will be placed down inside of the plants so there is no mark placed on the outside; they could be very easily passed there, and unless the inspector is quite well acquainted with the different groups of insects and their habits of depositing and habits of hiding, it will be quite easy to pass them over. The quarantine of insects within the State is also a very important matter. Just last week I returned from a trip through the Porterville, Lindsay, and Exeter orange section, on the advice of Mr. Jeffrey especially. It was thought that the orchards in that district were free from certain scale insects, the red, the yellow, the purple, and the black scales, and we know that almost any one of these forms or all of them are common throughout the orange sections in the south. After looking over the field I found that it was true that the insects were not there, and the people of Porterville and the whole section there are entitled to protection against these insects that might be introduced on nursery stock from the southern part of the State, or from any part of the State or from without the State. The point is a very important one just now to the Tulare County orchardists.

PRESIDENT JEFFREY. I would like to emphasize one thing that Mr. Moulton said about knowing pests. He went down to Tulare County at my request the other day. There has been a long dispute down there about whether Katy did or Katy didn't. He is going to bring you some oranges to-morrow to show you that Katy did. He will show you oranges with great holes cut out of them, and they have got a katydid brand there, where they separate thousands of oranges and call them the katydid brand, because the katydid ate a little spot out when it was as big as your thumb and now it is a blemish as big as a quarter. Now, Mr. Moulton, or any good entomologist, could see those oranges and tell those people just what had done that damage. This is the reason that entomology is valuable, this is the reason your horticul-

tural commissioners should know those things. Mr. Moulton has told those people what has been doing this. The thrips is working on the oranges also, and Mr. Moulton will show you to-morrow the difference between the work of thrips and katydids.

MR. HICKMAN. Mr. Chairman, you spoke of the thistle in connection with your remarks to Mr. Hecke and speaking of that as something the horticultural commissioner should look after. It probably is hardly second to that of the entomological feature. It was my fortune some twenty-nine years ago to find a single plant in the Salinas Valley. That plant I know has spread down the river into the slough and the afternoon winds blew it up to the mountains. That is making a vast deal of trouble. I know one man in particular that it has cost several thousand dollars. I suggested to him that he pull it up but he paid no attention to it. In three or four years the plant had taken the land. His pasture field is no good. He plowed it up; the rains came. You know the result. That field now is several fields. That same thing took place within five miles of where we are sitting now this last year. It cost the county thousands of dollars to clear its roads. In that same neighborhood in one particular place it had caused an erosion or washing out of the hillside, that you could drop this whole building in. I noticed one field thirty-six years ago near San Juan where a stream had brought down its detritus. I noticed that field every year was plowed and never raked. When it came to raking it they could not drive a horse through it because of the needles on the thistles, until two years ago that particular piece was cut up and put in the hands of a gardener. That piece had always cost a great deal and returned nothing. This last spring, in passing through a man's orchard, he said, "I can't kill that thing out." I said, "Why?" He said, "It always grows as fast as I try to get rid of it and I plow before it goes to seed, when it isn't in blossom." I picked up one and showed him that it was already practically in seed and he had been really sowing the seed of that plant every time he cultivated it.

Now, on the heavy lands of the Pajaro Valley this year, you notice a plant that looks a good deal like lettuce. The plant in itself is perfectly harmless—that is, as regards any objectionable feature, but the thing produces a seed and the more you undertake to cultivate it at certain times the worse you spread it, and that thing takes the whole field. There is only one way to do and that is to summer-fallow the land or put in summer crop and keep it there a while.

As regards the thistle, every orchardist and every school child should know that plant. The department at Washington sends out publications that illustrate it so that any one that is used to recognizing things from illustration would know it. I did. In the alfalfa seed I planted I found the plant. I mowed the field, burned it, plowed it up; everything that came up was cut and burned again, and so for three years. That was the only thing that saved that particular case from spreading. I might go on for hours with illustrations of this particular work. Another thing. Last Saturday night we had quite a heavy rain and yesterday, in passing a neighbor's place, I saw that that rain had washed off the whole surface of the ground for about twelve feet wide as deep as he had plowed it. He had no business to plow the swale, in the first place; in the next place he should have protected it. Some-

body ought to put a stop to it; there should be no such thing as a man plowing up the natural waterways on the hillsides. They should have a grass of some kind that would hold the soil, for a cover crop.

In connection with this, I passed to-day, coming in, a plant that has been sold for years by florists as alibeya. I noticed in Riverside they had it between the sidewalks and the curbstone. It looked like white clover. A friend called my attention to it in his yard and I said, "Step out here on the hillside and you will see it growing." Wherever the land is moist enough that thing will hold your land, and you can get all the pieces you want from several people here. There are thousands of such things that are of interest, not only to orchardists, but to the public generally. It is one side of the forestry subject. It is worth while for every horticultural commissioner to be pretty well posted in that.

MR. COSTELLO. If I am in order I would like to finish my discussion of the subject on which I started to speak. I think it is of great interest to all of us, because I intend to take that examination myself, and I was trying to tell the gentleman that I thought a horticultural commissioner, after he had passed the examination, should devote his whole time to that office. I don't think he could very well sell goods or keep books for a company and still be a good horticultural commissioner, because I find that it takes all his time, and more, too, than he has studying up those different fungicides that come. In northern San Joaquin many people would say, "Why don't you let your inspectors go? The thing is over; there is nothing more to do." Sure enough, the battle is over, and when the battle is over they always put out a sentry to keep guard to see that nothing comes in. When a commissioner qualifies and just devotes a little bit of time to it there is nothing more to it, because the people say, "Oh, he don't care; he is just drawing his money and he is working selling beans down on the dock." Maybe is out to the race track running races with his horses. So, you must be a commissioner. If you are going to take that office, you must make up your mind that you must tie yourself down. If you have got the thousand dollars you can put it up yourself. But I haven't got the thousand dollars to put up. I have got to go to some of my friends and they must put up a thousand dollars that I will come through. Suppose I was down to Emeryville running horses; they would say, "That fellow don't know sic'em; he is just drawing his money." So it must be that a commissioner must get right into the collar and get right down to business. I have been at it about four months now studying night and day, and it is a pretty stiff proposition to be a commissioner, I find, and I haven't got started yet.

PRESIDENT JEFFREY. I would like to say one word of warning. There is a lippia in the Sacramento Valley that is becoming one of the worst weed pests in the valley. It is taking the pasture lands, crowding out other vegetation and the farmers are alarmed over the lippia, not the *Lippia repens*, but there is another that is almost identical in characteristics. We must remember that if our horticultural commissioners do not stand between the people and these losses, there is going to be an abandonment of thousands of acres of the best farming land in the State, especially from the Johnson grass and the lippia and the Russian thistle and the Napa thistle, particularly in counties where

farming operations are carried on largely. We ought to impress the growers and the officials that the agricultural interests of the State are just as much in danger and are suffering just as severely from weed pests as the horticultural interests are suffering from insect pests. Let us make that a part of our declarations by resolution, Mr. Kellogg, and then the supervisors, if they represent farming districts, will be willing to put up the money.

MR. HICKMAN. I will say, in regard to that *Lippia repens*, that just east of Gilroy the plant has been, to my knowledge, since 1873, and it has never spread into the fields. You probably know that the *Lippia repens* does not spread. Here, all the way around the waterways, from the bridge a mile and a half up, I noticed to-day the only place where it showed any disposition to spread was behind Mr. Allison's house, and there it does not spread beyond the wet ground. It also is a good feed.

MR. RODGERS. As this is devoted to topics of interest to commissioners, I have here what purports to be a copy of the horticultural law, and if our worthy Commissioner will take the Chair, there are a few things I wish to bring out concerning it. I believe the enactment of this new law is a step forward, from the fact that we will have better men in office, more profound in the specialties required of them, but it seems to me there are some discrepancies and shortcomings that should be corrected, and as long as we have started along that line I think it would be well to bring the matter up at this time and have it threshed out, either at this time or the next convention, and taken up in due time before the legislature. There are several little points. I notice here in section 2322*b*: "The State Commissioner of Horticulture may issue commissions as quarantine guardians to said county horticultural commissioner and to the local inspectors appointed by him." It seems he has no power, according to this, of making a quarantine guardian of these deputy commissioners. Again, I fail to find here what the duties of a deputy commissioner are; they are not prescribed. There are two points which, it seems to me, should be rectified. Then, a little further down, it states: "The said quarantine guardians, local inspectors, or said county horticultural commissioner, have full authority to enter into any orchard, nursery, place or places where trees or plants are kept and offered for sale or otherwise, or any house, storeroom, salesroom, depot, or any other such place in their jurisdiction, to inspect the same, or any part thereof." Nothing said about the deputy being permitted to go into those places. I presume, of course, we assume that he has that right, but in case of a contest you know lawyers like these little technicalities, and it seems to me it would be very little difficulty to rectify these matters so as to make it clear and concise.

In section 2322*c* it is said: "It is the duty of the county horticultural commissioner to keep a record of his official doings, and make a monthly report to the board of supervisors." Why should he make a report to the board of supervisors? What does the average board of supervisors know or care about the doings of the commissioner? If he should make a monthly report to anybody, I think it should be to the State Commissioner of Horticulture. Then, I fail to see also where he is per-

mitted, according to the law, to buy any stationery, stamps, etc., to be used in correspondence, nor is he permitted, according to this, to make any publications to his people as to what he is doing. The commission in this county has carried on really most of its work through the Orchardists' Association and by publications. This county has been at very little expense as far as the commission is concerned. That was one of the first points brought up when the commission was organized, that no one should ever set up the claim that the commission was of any great expense to the county. I will say that the newspapers, at all times, have had their columns open to the commissioners. By organizing we have had the support and backing of the people, but we have not been permitted, according to the law, to go to the expense of anything. Now, again. There are no appropriations under this law whereby a commissioner can carry on experiments or investigations. We might take the best man obtainable and his hands are tied. All he can do is to look at an orchard and say, "You go and clean that up." It does not seem that he is even authorized to tell the man how to do it. The supposition is that he will tell him what to do. I say that any man who is competent under this new law to fill the office is competent to carry on experiments to see if he can devise ways and means whereby he can cheapen remedies or take a short cut towards the extermination of insects or find new processes. Now, to illustrate, in our own county. We were up against the codling moth a few years ago. We sent for bulletins from the State University and to the Horticultural Commission for information as to how to handle the codling moth. They sent down their bulletins, and in every case it said, "Use Paris green every two weeks, about sixteen times during the season." They used Paris green, and the consequence was it burned the foliage, and if we had not taken this matter up and gone at it and had a thorough investigation made and tests made, the codling moth would have destroyed our orchard industry. The University, of course, did most of the work, but we had to stand a portion of the expense, and after calling on the University and after they had solved the problem, we saw fit to retain one of their men. We became ashamed of ourselves, calling on the University for four years. They solved the problem and showed us the remedy. They showed that by using a good brand of arsenate of lead we could control the insect and there would be no damage to the foliage. We were not satisfied. We wanted to find out how few times we could spray and how small an amount of material we could use in the application and get good results. We have this man still at work, and he is still striving to cheapen the method of eradicating these pests. And I say that there should be a provision in the law whereby the supervisors would have the power to set aside a sum for the use of the commissioners. I think those points should be carefully considered.

MR. KELLOGG. Will you please give the points to-morrow, where you would recommend the amendment of the law, to the Committee on Resolutions, either to Mr. Judd or myself?

MR. BISHOP. As to the report to the supervisors, this is a per diem job and not a salary job, and they want you to make the monthly report so they can know how many days you worked and what you did. Furthermore, I don't believe the commissioner has time to carry on any

extensive experiment. His office, according to my notion, should be a source of information, and if he does not have it he should get it from some other source and that our experiment station should do most of the experiments. The board of supervisors, if they see fit, can allow the commissioner money from the general fund, if he can demonstrate to the supervisors that he can by experimenting find something that will be beneficial to the agricultural interests, and if the agricultural people back him up the supervisors can not object. I don't view the office of horticultural commissioner as an inspector of insects or fungus diseases altogether, because they have asked us about soil culture, and I have spent as much time in studying soil and soil chemistry—twice as much time as I did studying insects, and I think the beet grower or the wheat grower has as much claim on us as the man who raises oranges or apples, and if he wants information and we can find it, it is our duty to write to some one and find out the information that he desires.

PRESIDENT JEFFREY. A great deal of the objection Mr. Rodgers has made to-night seems reasonable and it would be held as a vital defect only for this fact, that the law requiring the appointment of horticultural guardians throughout the State has been nullified by the horticultural law of 1903, under which I am acting. This particular part of the law was left in by accident, but it is not a defect if you read it in connection with the State law. Because now no quarantine is possible in the State without an order from my office, countersigned by the Governor. If you had quarantine officers like we formerly had, they would have to get an order from me, countersigned by the Governor, consequently the law requiring the appointment of quarantine guardians has been nullified by the enactment of the law of 1903, which provides another way of quarantining.

MR. COSTELLO. In explaining one portion of the gentleman's argument in regard to the law, why the supervisors want a written statement is that in case the grand jury of each county wants a statement it finds from that statement what the commissioner or the inspectors are doing. Sometimes a complaint may be made that the inspectors or commissioners are not doing their duty, and the grand jury gets to work and digs up those documents and they find out that the inspectors and commissioners are doing their duty and they have been paid according to law. If there were no bills to present the people would go after the grand jury and call them grafters.

The convention here took an adjournment until to-morrow at 9.30 o'clock A. M.

SECOND DAY.

WATSONVILLE, Cal., December 8, 1909.

President Jeffrey called the convention to order at 9.30 o'clock A. M.

PRESIDENT JEFFREY. The first paper on the program this morning is "The Almond Commercially Considered," by Mr. J. P. Dargitz of Acampo. Mr. Dargitz is a practical almond grower. (Applause.)

MR. DARGITZ. *Mr. Chairman, Ladies and Gentlemen:* When I consider the desk where I stand and the thoughts that are promulgated from here and my past relation with the people who worship here and the people with whom they affiliate, it seems perfectly proper that I should take a text this morning and I am going to do so. Genesis xliii, 11: "Take of the best fruits in the land, balm, spices, myrrh and almonds." Jeremiah i, 11: "Moreover, the word of the Lord came unto me, saying, 'Jeremiah, what seest thou?' and I said, 'I see a rod of an almond tree.' Then said the Lord unto me, 'Thou hast well seen.'" It seems to me we have got a good starting point now.

THE ALMOND COMMERCIALLY CONSIDERED.

By J. P. DARGITZ, Acampo, Cal.

The almond is by no means a new nut, and perhaps justifies the old saying, "there is nothing new under the sun." More than four thousand years ago Jacob made use of it in his efforts to achieve commercial success, though in a different way from that which we have in mind to-day. Later in his life the same Jacob, chastened by his experiences, classed the almond as among the choicest fruits in the land. We are not told whether it was a hardshell or a papershell, a Nonpareil or a Texas Prolific.

It was from an almond tree that Moses cut the rod which became a serpent when he cast it down. May we get a lesson from this to the effect that we should not look with indifference on this nut-bearing tree, whose beautiful blossoms furnished the divine pattern for the bowls of the candlestick in the Jewish tabernacle? The prophet Jeremiah was also commended by the Lord of heaven and earth for seeing a rod of an almond tree.

The bringing of almond trees from Europe to California as early as 1853 had about as much religious significance as anything else brought here in that early day. It was soon discovered that even "Sunny California" would not produce almonds in every nook and corner. This, like most of our horticultural successes, came about by lessons of bitter experience, whenever we have proceeded without due consideration. However, we have learned, little by little, until the almond crop of this State now aggregates over half a million dollars annually, and there is no good reason in the world why it should not equal three million dollars, as the people of the United States consume that quantity now. That the consumption of this excellent nut is increasing in the United States is shown by the fact that while in 1907 the consumption was 7,900

tons, in 1908 it was 11,200 tons, a clear gain of over 40 per cent in one year. When it is understood that over 75 per cent of this consumption is imported from Europe, and that the area for the home production of this nut is practically limited to California, and a very small portion of the State at that, we will hardly need to think of overproduction for a lifetime at least. In fact, I doubt if we will ever be able to keep up with the growing consumption. Therefore, in view of the viticultural situation and the great influx of population and development of our resources, is it not worth while to look seriously into the commercial possibilities of the almond?

The almond is such an early bloomer, such a shy bearer in some varieties and locations, and such a "sensitive plant" with regard to bearing, that I would emphatically advise all who anticipate starting in almond production to gain all possible information from the experiences of the past, and especially as to the behavior of the various varieties in the locality which you have under consideration. If there has been no proving in such locality, then get all your information and begin slowly and prove the varieties for yourself. Of course, if you plant an almond orchard, and it does not prove a success, your effort has not been entirely lost, for you can profitably work your trees over to other varieties of fruits. You can change varieties of the almond by grafting or budding, or you can work plums and prunes on them very profitably. The writer's brand of sugar and giant prunes, which has won high standing among the trade in the East, has been achieved with fruit grown on almond trees worked over to prunes after they were fifteen years old. In this connection I would especially advise the reading of E. J. Wickson's book, "California Fruits and How to Grow Them." In this you will find very much that is helpful in getting your starting points.

CLIMATE.

In the matter of climate you must consider both frosts and a tendency to continued wet weather at blooming time. I am satisfied that crops are as often lost by wet weather during blooming time as by frost. It takes sunny weather in blooming time to ripen pollen. Note the odor of honey and perfume in the orchard when the trees are in bloom, if it is sunny, as against the lack of such evidence on a cloudy or rainy day. Moderate frosts in winter while the trees are dormant, or even when they begin blooming, does not always presage damage. But there should be no late spring frosts. Bear in mind that the almond is the earliest bloomer of all our fruits.

LOCATION.

A sheltered location where there is a ravine, or some lower ground close by, which may draw off the cold air after night, in a usually frostless situation would be ideal. The crop does well even in low altitudes (our orchards being only seventy-five feet above sea level), while there are some young orchards on Paradise Ridge, in Butte County, at an elevation of 1,700 feet which are doing well. They have a deep ravine on either side of the ridge which draws off the cold air so that ripe strawberries may be picked from the field at Christmas time.

Portions of Butte, Colusa, Lake, Yolo, Solano, San Joaquin, Contra Costa, and Sutter counties have been proven for almond growing.

SOILS.

The almond likes a deep, rich, sandy loam soil. It should be deep and well drained, because this tree will not endure wet feet much better than the peach. The soil should be rich, for the tree is a ravenous feeder. It must have plenty of soil moisture, as it is the earliest to begin work in the spring and the last to take its annual vacation in the autumn; and to make good strong fruit buds for the succeeding year the tree should hold its leaves well into November. It can not do this without good moisture conditions continuously throughout the season.

VARIETIES.

Perhaps there is no point in the whole proceeding wherein greater care is necessary than in the proper selection of varieties. Everything else may be very good, but if you have the wrong variety you will likely wait in vain for your commercial success. It is utterly impossible to give the one best variety for all sections, because it is not at all likely that any one variety will do equally well in all localities. If you are greatly in doubt get some budding sticks of the variety you are considering and bud them on one of the proper trees in your neighborhood. In two years, certainly in three years, you will have the beginning of your proof. However, no one should emphasize the qualities of any nut or fruit by one or two years' proving. It should require ten or a dozen years proving before speaking out with authority. If this plan were generally followed we should not have so many disappointed orchardists. Usually, when a man finds a new fruit which has extraordinary quality, he forthwith begins to herald it and people begin to plant, yet it might be such a shy bearer or poor keeper as to prove a commercial failure, no matter how excellent the fruit might be.

The original almond was no doubt a hardshell. In fact, we know of nothing like the papershell nut until in recent years, and I doubt if one in five of the population of the United States even now have ever seen a papershell almond. Whenever any animal or vegetable product is bred very highly for quality, it is apt to be lacking in quantity when it comes to reproduction or propagation. So with the almond. The papershell is largely deficient in pollen. So sure am I of this that I would not think of planting a block with all papershells, no matter how much the varieties might be mixed. It has been customary to plant an occasional seedling or bitter almond in the orchard so as to furnish the necessary pollen; but we now have varieties of the sweet softshell which answer the requirements and are profitable.

My first and great reliance is on the Texas Prolific. I am planting it solid, and am also alternating it with other varieties, for the benefit of the other varieties, however. It blooms later by two weeks than any other variety that I know of, tree grows well and bears every year. Trees now twenty years old have born seventeen consecutive crops. I would also plant Nonpareil and Drake's Seedling, alternating either variety with Texas Prolific every two rows. It is easier harvesting if two rows of a kind are planted together. The Nonpareil ripens early and can be gathered before the other varieties are ready. Then comes the Drake's Seedling about three weeks later. The Texas Prolific comes along about two weeks later than the Drakes, all of which is a great

advantage if you have a large acreage. These are the three proven successful commercial varieties in our locality. Whether they will do so in your locality I can't say, but on general principles they should, and are worthy a trial. In Yolo County the Peerless is a great favorite. In some localities the I X L is said to be a good bearer. If so, it is a good nut to plant *there*, because it is a good nut and will not meet with much competition from other localities.

PLANTING.

Secure the best trees you can get. It is poor policy to plant an inferior tree because it is cheap. There is great opportunity for some one to become a benefactor of mankind by developing superior strains of the best varieties of nuts as well as other kinds of fruits. It is a fact that there are some trees in every orchard no matter what the parentage, which grow better and bear better than others growing by their side and of the same parentage. I am sure that this will be found to be true in fruit trees as it is in the animal kingdom, yet how utterly indifferent we have all been on this great point which means so much on the commercial side of our work! In good soils, where the growth of the tree will be vigorous, 25 by 25 feet is plenty close to plant. When the trees are twenty years old their branches will touch, and they will need room for twenty or thirty years more.

PRUNING.

The first three years you will need to shape your tree. After that you will only need to remove water sprouts and an occasional cross limb, until your trees get very large, when you will need to cut out some of the big wood and open up the trees. Mr. Adams, my neighbor, says "Prune so a bird can fly through the tree," and he is about right. The tree requires much less pruing than a peach tree. With the peach tree we prune to lessen the pieces of fruit, but with the almond tree we want to increase the pieces in number. I never knew of any one having to thin a crop of almonds although in 1908 we did have some limbs as large as my arm break with their load of fruit.

SPRAYING.

You will need to spray your almond trees sooner or later. You may have to fight the fungus growths. If so, then you will find a friend in some form of lime, sulphur, or bluestone. You may have to fight red spider; then sulphur is a good remedy. It may be you will have to fight the peach moth larvæ; then some form of the arsenicals. In the writer's judgment you can just as well use your materials dry as wet. I have used the dry or dust spray exclusively for three years and am quite well satisfied with results. The great difference is on the commercial side of the expense account. The method we use is as follows: In December we spray with lime, sulphur and powdered bluestone (sal Bordeaux). We use 40 pounds of lime (Vigorite brand), 5 pounds of sulphur (Anchor brand), and 2 pounds of sal Bordeaux. This makes a very good treatment for two acres. When the trees are in full bloom we spray again with the same mixture and add to it 2 pounds of Paris green or 2 pounds of arsenite of lime. If there is evidence of the peach

moth larvæ at work in the buds later, we spray again the last of May so as to catch the second brood, using the same formula as in the previous spraying, though the sal Bordeaux may be cut down one half or omitted entirely if there is no evidence of fungus about the trees. If red spider makes its appearance, then a treatment of the sulphur alone will settle Mr. Spider and turn the foliage from yellow to green in three days' time if you do not wait too long before spraying. In applying this dust spray we use a power machine which is quite inexpensive, mounted on a wagon and driven by a two-horsepower engine, the whole outfit weighing only about 1,000 pounds, drawn by two horses and operated by two men, which readily treat forty acres per day. The amount of material seems small to be effective, but being applied as a mixture instead of a chemical solution, as in the wet spray, it is every bit active. The principal thing, however, is to spray if needed, and if you don't want to use your application dry, use it wet, but be sure and *use* it.

CULTIVATION.

None of our orchard trees yield quicker or more decisively to good cultivation than the almond and the principle involved seems to be to maintain a sufficient degree of moisture. We are trying an experiment on a block of fifty acres of old almond trees, having seeded it to alfalfa last April. We shall water this as often as necessary, but cut no hay, allowing it to grow and fall on the ground as a mulch. If the trees do not bear with this treatment I will have added to the soil any way. When our orchard trees get to be over fifteen years old they will require irrigation where they got along very well before with good cultivation. Of course, I am speaking of conditions in our locality where the soil is deep and retentive of moisture under good cultivation, but without any subirrigation or summer rains.

HARVESTING.

Presuming that we have secured a crop and that it is time to gather it, we now come to the matter of harvesting, which is no small item in a commercial proposition. I am told that about fifteen years ago a company in our neighborhood who had about one hundred tons of a crop to harvest and having no machinery, advertised in the San Francisco papers for five hundred hands to help harvest their crop. About three hundred came a week ahead of time, and then it became necessary to bring out a squad of policemen from the city. We would not think of requiring over fifty people to handle such a crop now.

When the hulls on the nuts are loose from the shell, as will be indicated by their bursting open, it is time to begin gathering if you wish to hull them. If they get too dry you will have to wet them before hulling or you will break the shells. If you wish to shell them, then the drier the better. It will not pay to begin until the nuts about the crotches of the trees are ready and they will be the last to ripen. That is, it will not pay to go over the ground twice. When they are all ready you can get all at one gathering. Have some sheets made of heavy unbleached sheeting or light duck or sail cloth. Mine for large trees are 15 by 30 feet. Two men to a sheet and two sheets to a tree. Spread the sheets under the tree one on each side, lapping the edges where they join. Then the men take willow or bamboo poles and by

jarring the limbs cause the nuts to fall on the sheets. Always strike the limb sideways for if you strike a glancing blow down the limb you will bring your chances of next year's crop with you. The object is to get the nuts and disturb the foliage as little as possible. Of course, you will get some nuts and twigs with the leaves any way. When the nuts are all off the tree, the men toss their poles to the next tree and then gather up the sheets, one man at each end of each sheet, and lifting them, carry them to the next tree, where the process is repeated. That is what they should do, but if you are not watching they will drag the sheets. If the time saved is worth more than the extra wear and tear on the sheets, then by all means drag them. When enough nuts are in the sheets to fill several lug boxes, the boxes are placed on the ground side by side and the sheets are emptied of their burden. These boxes are then stacked up so as to be easily seen and the teamster gathers them up and hauls them in to the shed, where they are run through the huller and then placed in the hoppers ready for the hand sorting. After sorting they are placed on trays or board platforms in the dry-yard to cure. They should be cured until the kernel will break without bending. Then they are ready for bleaching; but be sure they are thoroughly cured before bleaching or the kernel will absorb the sulphur and be spoiled. When properly cured, any means may be employed which will thoroughly dampen the shell, but not penetrate to the kernel and then be subjected to the fumes of burning sulphur for a period of thirty minutes to one or two hours owing to the variety and condition of the nut. A yellowish white color of the shell is demanded by the trade. Do not over sulphur. When sufficiently bleached they are removed and placed in the sun for a few hours to dry and then sacked up ready for market. My present plan of bleaching is as follows: When cured we place them on fruit trays about one inch thick and run them into a bin of the sulphur house which has been connected with a steam boiler (5 horse power), and then low pressure steam (20 pounds) is turned into the house for a half or three quarters of an hour. Then they are removed and quickly run in another bin, which has a sulphur charge ready fired, and bleached from forty minutes to an hour, when they are removed and immediately sacked. The same help will bleach twice as many in a day with steam as without it. Be careful not to use high pressure steam or you will cook the nuts. For this valuable method I am indebted to Mr. Reed of Suisun. Only standard almond sacks should be used, and while they seem expensive, they are a commercial success because they weigh two and a half pounds and no tare is taken by the trade if you use these sacks.

The almonds may also be shelled instead of hulled, as there are machines for shelling which do very good work. The present year our crop was light and we shelled our entire crop of about twelve tons of clean kernels. We figured better prices this way. Nearly all the imported nuts are shelled before importing. If you shell they are not to be bleached, and you have all of the shells to work back into the soil as material for humus, which is no small item. For a commercial proposition if you can get the same money for your product shelled, saving thereby half the hauling and return half the tonnage to your soil which you would ship off if the product were hulled, better do it.

MARKETING.

And now we come to the keystone of the whole matter. We may get lots of pleasure and satisfaction out of our orchards in producing a beautiful bloom and a splendid crop, but unless we can turn this into cold hard cash it will never be considered as a commercial proposition. It must pay! We must be able to make a net profit over and above the cost of production, or there will be no inducement to become or continue to be a producer. The last few cents per pound that the market warrants will be that net profit, and you should have it. Don't forget this. There are various efforts at coöperation among growers which are more or less successful, but there is no other line in which all might be enlisted as easily as the almond growers. The reason for this is the ease with which values may be determined. Just as long as the larger part of the almonds consumed are imported it is is plain that the price of the foreign product must fix the price of the home product. When we have a plentiful crop on this coast we have to ship some to the East. Therefore, the price of foreign almonds laid down at New York, duty paid, less the freight from here to New York will determine the price on this coast. When crops are light here we consume all our product on the coast, and then the price of foreign almonds landed at New York, plus duty and freight out here, will determine the price here. This is so fixed and definite that it should be easy to determine the market price, yet very few seem to know about it.

The present method of marketing in a haphazard way works a hardship on the grower because he does not always get a fair price for his product, the price the market warrants. As at present operated, the speculators learn about the foreign crop late in June or early in July, determine what the maximum price on this coast will be and then endeavor to purchase from the grower just as much below that price as possible. The object is not to buy low and sell high, for they usually sell on a fixed margin above cost, but the aim is to undersell their competitors when they go to the jobbing trade, as this is the one method above all others which will bring them business. The system is not to their real advantage, however, because they never know when a competitor may be able to buy still cheaper from some other grower and so undersell them or cause them a loss. The party who bought our almonds this year said he would just as soon pay 30 cents as 20 cents if the market was steadied so he knew just what he was doing. But when he buys on a two-cent margin, and some other buyer succeeds in buying from some other grower for two cents less, then the other buyer is able to depress the market to that extent in his quotations to the trade, and my buyer, as well as others who were inclined to deal fairly by the growers, suffer a loss which untimately falls on the growers themselves. Understand that if you sell below the market price, you not only lose the net profit that should be yours, but you cause a loss to all other growers and fair dealers. It is absolutely a case where no grower stands or falls alone, but he necessarily carries his fellow men with him. What we want is some method of marketing that will make the market for almonds as steady and stable as the market for flour or sugar. This will work no hardship to any one, but will be universally beneficial. It is a plan that ought to meet the approval of every buyer and seller alike. Then why not?

Local associations, able to render much valuable assistance to each other in the way of providing spraying, hulling and shelling machinery, of promulgating advanced ideas as to varieties, production, detecting and fighting pests, proper curing and preparing for market, marketing, etc., is the first step. It should not be forgotten that uniform handling and standard grading will be necessary and of untold advantage to the grower. Nothing like it could be done which would so speedily put the almond production on a solid footing and relieve some of the other lines of orchard and vineyard production. It would bring multiplied wealth to our State, employment to our citizens by increasing production, and help to settle the food problem of the race, because it is one of the most valuable and condensed forms of food production.

At present there are organized associations of almond growers in Sutter, Yolo, and Contra Costa counties, and in our own neighborhood we have a quasi association which handles 80 per cent of our output. Every one of these associations has wrought good results for its members and the trade. Then why not extend the work of organization? Let the growers in every section or community organize an association, and then all the associations select or form some central marketing exchange which shall do the marketing of the crop. This central exchange, with the foreign and home crop statistics before it, could determine what would be a fair price and should be given power to maintain said price. My word for it, the buyers would be just as glad as the growers to have this done if they understood it, and they might be given a hearing in fixing the price, but always the growers' organizations should hold the deciding vote. This is a point which can not be too strongly emphasized, because it touches on the weakest point in our body politic to-day. The farmer and the fruit grower constitute the only class of people in the world wherein the producer does not fix the selling price on his own products. The manufacturer, the merchant, the professions, labor organizations, all say what their services and products are worth. Is it not high time for the farmer and fruit grower to wake up and take his stand alongside of his fellow man? But it requires a Moses or a Joshua to mean success! Yes, to be sure; and also be sure that whenever anything is right and needs a Moses or a Joshua, the Power that shapes the destinies of men and nations will not be found wanting with the man or leaders. It all means dollars for every one engaged in the business and that spells *commercial success.* (Applause.)

PRESIDENT JEFFREY. The convention has heard this very able article and a great deal of good advice regarding the cultivation of this crop and the varieties to plant. We will not have time to discuss any of these papers this morning, as we want to give the other numbers full time. You will please note down any points you want to discuss. The second part of the program to-day is "Citrus Culture in the North," by Professor Elmore Chase of Fair Oaks. (Applause.)

MR. CHASE. *Mr. President, Ladies and Gentlemen:* When, a few weeks ago, our honorable Commissioner asked me to prepare a paper on citrus culture in the north, I protested that a man who had had only ten years' experience in this work was not qualified to do it. He said, "'You can do it.'' I will try because he said so. I suspect, from that

instance, that when our Commissioner has all the counties organized he will ask you to do something and you will be sure to go and do it. Things seem to be coming and have to come now. When I went to investigate some of the orchards in the northern part of the State I called upon a gentleman who was very successful in growing oranges, and I said to him, "We have come here to find out how you raise such a large crop of fine oranges in Oroville, larger than we raise in Fair Oaks." He said, "I can't tell you." The editors of horticultural papers put more into their papers than they can put in the ground, but I can assure you I can not put on paper what the orange grower puts into the ground, and so my paper is disappointing to me and I am afraid it will be to you, but the thing is in the ground if we can get it out.

CITRUS CULTURE IN THE NORTH.

By Prof. Elmore Chase, of Fair Oaks.

This paper will treat in a general way of the orange, not referring to grape fruit and the lemon, though both of the fruits flourish equally well with that of the orange. If any difference exists, it is in favor of the grape fruit. The methods of culture which apply to the orange will apply to the growing of other citrus fruits.

The citrus region of northern California has very indefinite boundaries; but it has been demonstrated by a few years of experience in growing this fruit, that it can be grown successfully over a great portion of the State, except in the extreme northern counties and in the higher altitudes of the Sierra and Coast ranges and in the lower interior valleys. The fact that the extreme southern counties have made this their chief horticultural industry, has given the impression abroad that this industry will not flourish elsewhere. Outside of these counties there are large areas extending the entire length of the San Joaquin and Sacramento valleys and as far north as Shasta in which very fine citrus fruits are grown. Not all of this area is suited to this industry, but the places which are suited to it are very numerous, and the acreage is rapidly increasing. Kern County produces a fruit of exceedingly good quality. Porterville and Lindsay in Tulare, and other places along the foothill lands are sharing the honors of this industry with similarly favored sections of the south. Placer has become well known by the orange groves of Loomis, Newcastle, and Penryn, and Sacramento by those of Fair Oaks and Orangevale. Butte County is made famous by the Oroville district and the adjacent colonies of Palermo and Thermalito. In fact, this county may be said to stand at the head of this industry in the farther north. It has an orange tree transplanted from Sacramento to Bidwell's Bar in 1859. Yuba and Stanislaus are pursuing this industry on quite a large scale, while Sonoma has been holding citrus fairs for the past ten years. Amador and Calaveras are not behind other places in growing a very excellent quality of fruit. Fresno also comes in for her share. Thus it will be seen that citrus culture in the North is boundless.

Let it be noted, too, that while orange trees from twenty to fifty years of age are growing all over this section of the State, the commercial industry dates back less than a score of years. This industry, while it has passed the experimental stage, is as yet in its infancy, and

is now pushing to the front and contributing its share to the wealth and culture of our great commonwealth. No other class of producers is so active in seeking a better knowledge of horticulture than are the citrus growers of northern California. The appropriation of $16,000 for the purpose of investigating plant diseases in northern California, is equivalent to establishing in this section of the State an experiment station. The benefit of this appropriation is beginning to be felt in the citrus growing interests.

The burden of this paper is to try to answer the question, why a larger yield to the acre is not produced. While in quantity our products do not equal those of the southland, there is nothing to discourage any earnest grower. In quality, both of flavor and sugar content, there is nothing more to be desired. Northern California oranges suit the palate of the most fastidious orange consumer in the East, and that, too, many weeks before our fellow growers in the south can offer their products.

In the first place we have the earliest product in the State. Then next, in the absence of frosts and high winds, we have much to be thankful for. The absence of fogs saves us from many insect pests. The foliage of our groves always presents a brighter green and a cleaner face than is found even in the more southern belt of our section, an indication of health and vigor. The abundance of water and the system of irrigation contribute largely to the natural advantages of fruit growing, especially the citrus. These are some of the advantages the north enjoys over the south.

The one thing now is how to increase the quantity of the product per acre. It must be remembered that our trees are yet young. With few exceptions ten or fifteen years is the age of the productive orchard.

The following statement may be taken as a reasonable estimate of the returns from a well cultivated tract in the citrus belt of the north: The third year, per acre, 10 boxes; the fourth, 50; the fifth, 100; the sixth, 175; the seventh, 225; the eighth, 275; the ninth, 300; and the tenth, 325. This, though not so large as is often reported in the south, is a good showing and is realized in Tulare and in Butte counties as well as in some groves between these two places. Not many orchards during the first ten years produce this amount per acre; but it is possible to do this, and after this period of growing with the application of the best methods known, these trees may be made to increase this yield almost indefinitely, and in proportion as this culture is wise, the quality may reach as high as 90 per cent of fancy.

How can this be accomplished? First, before planting, the character of the soil should be examined. If an impervious soil is found at the depth of two feet and it is so thick that dynamite will not break through it, the orange tree will be able to do work not more than ten years. If the soil is deep and the drainage is good, it is safe to plant the trees. But this planting must be well and wisely done. The Whitney ranches of Placer County have made their owner prosperous mainly on the method of planting. The soil is of a reddish gravel and looks not very inviting, but the orange tree seems to take to it. The hole is dug some six feet in diameter, and as many feet deep. Then it is widened by filling into the bottom the surface soils about the hole. The tree is planted and then a scraper is used to bring about the trees the surface soil near at hand.

Much of the land is hilly and ravines and "draws" are formed between the hills. These ravines and "draws" have been made by erosion. In most cases the land is composed of strata of different degrees of hardness. The deep soil is generally on the higher places. In cutting out the ravines or "draws" by erosion, several of these strata are cut through and on the sides of these slopes one or more of the ends of a hard stratum is very near the surface, so the trees planted on the brow of the hills sometimes do not thrive as do those lower down or on the top. The result is, if no heed is paid to these conditions, many trees will not reach the productive age except in a feeble and sickly condition. By blasting and excavating, and giving good drainage, such places will give good results. Successful growers after preparing such places, fill the hole with water, and if it drains readily plant the tree. If not, then another trial is made. The saying that "an orange tree must not have wet feet," is a maxim in citrus growing and must be heeded, always. It may be said that every step taken in planting, budding, and caring for an orchard of citrus fruit must be performed by labor skilled in this line of work, and nowhere is it of greater importance than in preparing and planting an orchard. The most important thing after planting is the caring for the tree. Nature has been generous in this particular in this State. She has put into the ground a sufficient capital for a good working basis; but this capital must not be all withdrawn before deposits are made. As the tree draws on this capital, the soil must be supplied with new deposits. Here it requires the greatest knowledge to do this and keep the trees working at their best. Many an orchard of fine promise has been ruined by irregular cultivation or "hit or miss" fertilization.

Irrigation is a matter of supreme importance. It must be governed largely by the character of the soil and the mode of application. The main idea is to give the soil a sufficient amount of moisture to supply the root system with all its needs before the next irrigation. This implies that the irrigation must be abundant, but not too frequent, and the water must reach to the depth of the lowest roots while the surface soil must be kept dry and sufficiently stirred.

Another matter which has much to do in reducing the yield in many orchards is the fact that so many trees are not the type of the true navel. It will be difficult to find an orange grove in the whole orange belt of the north which has not suffered to a greater or less degree because of the presence of such trees as the Australian navel and similar types. These in our most productive orchards are all budded over as soon as discovered. In three years from budding these trees will begin to produce fruit, and in five years the fruit will not only have paid for all cost, but will begin to bring in an income. In ten years such an orchard becomes the type of those which bring in the large incomes of which we read.

When our orchards shall have reached the age of ten years under the conditions which have been hinted at above, then the grower may exploit his trees according to his pleasure. If he wishes fabulous returns, he may spend a hundred dollars an acre for fertilizer, and he will not be disappointed. If he desires a more moderate and perpetual income, he may spend ten dollars an acre and receive from his grove a very satisfactory return. Mr. Mills of Riverside calls an orange tree a machine. Supply it with material and run it at high speed and it will turn out a

large product. Mr. Boalt of Palermo calls an orange tree a cow. Feed her high and she will yield the butter fat, but she will not last long. So, also, does high pressure speed wear out a machine. When $3,000 an acre can be made by this high pressure principle, the temptation is so great that it will be done if it kills the cow or bursts the boiler. An orange tree, however, is not a cow or a machine. It is a self-perpetuating, ever growing plant with self-regulation forces of plant organisms. It renews its fruit bearing organs every season and regulates its root system to meet all demands of fruit and foliage, provided it has the materials which it needs and its root system has the fullest freedom to do its work.

But the wiser method adopted by the majority of growers is to supply the fertilizing materials according to the normal demands of the tree. Stable manures and cover crops furnish the humus that every orange grove must always have, if satisfactory returns are expected. Added to these a liberal use of commercial fertilizer of any well known brand, the orange grove will keep in a good thriving condition for a whole generation.

Another important thing which must never be overlooked is the matter of pruning. The orange tree is so self-regulating that it requires little pruning. The most successful growers advise keeping the dead-wood cut out, removing the suckers and pruning back excessive growth which may to some extent destroy the symmetry of the tree and allowing the branches to grow low. More fruit is gathered from the lower third of the tree than from the upper two thirds, and is less subject to injury by the moving branches. The cutting out of dead twigs gives opportunity for more fruit to grow inside the tree, and this fruit is the finest of all.

During the whole life of an orange tree, deep and thorough cultivation is the command of every successful grower. This must be done to keep the lower soil loose and free from the so-called "hard pan," which always prevents the root system from performing its functions unhindered. Nearly every so-called disease of the orange tree can be traced to some soil condition which destroys the action of some portion of the root system.

The limits of this paper do not permit references to the methods of successful growers which would give more force to general statements. Each statement properly treated would be a topic for a separate paper, but it can be confidently affirmed that citrus growing in the north is destined to become a much more important branch of industry than it is at present. Indeed, with all other branches of fruit growing which have reached such a high degree of excellence, citrus culture of the north must become the overshadowing industry of our great commonwealth. A no more inviting field of usefulness can be offered to any one who loves his own State than that of establishing a citrus nursery in the north which shall have for its prime object to produce the typical navel orange tree; for this fruit can not be modified by changes of the embryo, but by adaptation of the bud development only.

The late lamented Lelong has said, "There is a subtle and delicate citrus quality that must be associated in all the qualities of an orange. It can only be described by saying that it appeals to the intellectual perceptions as that natural goodness and excellence inherent in the

choice products of nature. This can be eliminated from the orange and render the fruit insipid and valueless. We must be careful in the selection of stock and bud so that we shall draw toward this noble fruit and gift of nature the happy union of staminate and blended qualities that award the halo of ambrosial excellence." This is especially true of the navel orange.

The case is a clear one that northern California offers a very large field for the growth of the orange, lemon, and pomelo, if the knowledge of this industry now within the reach of all is intelligently applied at the beginning and continued during the life of the orchard. The main points to be followed are, plant only typical navels, in any soil that will give room for the growth and increase of the root system; begin to add fertilizing material early, cultivate constantly and deep, and irrigate deep enough to supply the whole root system with moisture, adding yearly humus-producing materials, either in the form of stable manure or green cover crops, or both, using liberally commercial fertilizers, and doing all these things so faithfully that the tree never for an hour suffers for the lack of this food. These things faithfully performed and a citrus grove will never fail to pay large returns on the investment in northern California. This is now being done in Porterville, Lindsay, Fair Oaks, Oroville and its colonies.

Colonel Weinstock once said, in speaking of the influence of horticulture in this State, that the people who produce the luxuries of life have a higher degree of civilization and live on a higher plane of enjoyment than those who produce the necessities of life. They love the good and the beautiful. Art, science, and literature flourish among such a people, and they become, if not always the originators of all the forces which improve the condition of the human race, the disseminators of all these forces. He referred to the French nation, which has been eminently the producer of the luxuries of life. "Her literature has been to the English what Aaron was to Moses," says Macaulay. Her university was the first great intellectual center of Europe. Scholars by the thousand have flocked to it from all over the world, so that through its influence, knowledge was kept alive and disseminated, so that, in one sense, the French university was the mother of all that were subsequently founded throughout the world. The foremost historian of the nineteenth century has said, "There is hardly any great idea, hardly any great principle of civilization which has not had to go through France to be disseminated." California, so similar to France in so many of its natural aspects of climate, soil, and nature of its productions, is already rising to that higher plane of civilization which may become to the other people of this continent, if not to the whole world, what France has been to Europe. Shall we claim too much for the influence of the orange that it has done and is still doing this work of a higher civilization? Recently some writer in Oregon entered into a very learned dissertation on the relative values of the apple and the orange. The former he placed among the necessities of life, the latter only a luxury. Some California journalist in a broad and generous spirit, such as must prevail where the orange grows, has rescued the apple from that low place and elevated it to a position where it belongs among the luxuries, and luxuries are necessities when man reaches the higher plane of noble living.

Surely the whole State of California appeals to man's better impulses, and invites him to come and make his home among her apple orchards and citrus groves, where are ever found those influences which lead to the best in human life. (Applause.)

PRESIDENT JEFFREY. The next paper is entitled "The Berry Industry," by Mr. W. I. Newcomb of Sebastopol. (Applause.)

THE BERRY INDUSTRY.

By W. I. Newcomb of Sebastopol.

In taking up the question of the berry industry this paper will be confined to Lawton blackberries, Antwerp and Cuthbert raspberries, loganberries, and Mammoth blackberries, with incidental mention of a few other varieties that are grown in the foothill region of western Sonoma, adjacent to Sebastopol, and locally known as the Gold Ridge country.

While the growing of stawberries is carried on to some extent, one of your large "patches" in the Pajaro Valley contains more than our entire acreage. We leave this variety to the Watsonville district, whose reputation for growing this berry is world-wide.

Berries have been grown in the Sebastopol district since 1872. At that time the late W. J. Hunt planted the first blackberries. It was soon proven that the sandy loam soil, together with the moist cool summers, tempered by the coast breeze, and an abundance of winter rains, made it a favorable place for berry raising. The first planting was of the Lawton Black variety, and its adaptibility has been proven by the test of time, for to-day it leads in production by double all other varieties combined.

The planting of Lawtons was soon followed by the Antwerp raspberry, which was usually called the Cuthbert, but differs considerably, both in fruit and growth, not being so rank a grower and fruiting in a shorter period, making it better suited for canning purposes, to which the berry business developed into, as San Francisco was the only fresh market available, and the profits from planting these two varieties stimulated planting to such an extent that in a few years there was such an overproduction that if the canneries had not taken hold of them the berries would not have been worth raising.

During these years of development berries showed the same fault that all other California fruits have shown, viz., production taking place faster than consumption, the finding of new markets for this class of fruit at a distance being considered impracticable on account of its perishable nature. The first attempt, when the production became too large for the San Francisco market, was in evaporation. Good success resulted in this effort and a good trade was built up. Then the cannery came into the field and the tide ran the other way. No berries were dried, consequently that trade was lost.

The cannery requirements for berries were easily met. Fruit too ripe for shipment was in just the condition for them. This led to loose methods of picking and handling and quantity only was considered, until the grower was handling his berries about the same as he would a hay crop, and was only sorry he could not use a derrick fork. All this

led to one result, the canneries saying they had more berries than they could handle at the price; consequently a gradual lowering of prices until during the past two years the returns, based on the valuation of the land and labor, would not pay the cost of production. This may look like a dark situation for the berry growers, but fortunately our eggs are not all in one basket.

CULTIVATION.

Cultivation of our berries consists of thorough plowing, hoeing and cultivating, no irrigation being done. Different habits and growth of the varieties, however, require different training. The Lawtons are upright growers, and are usually planted eight feet apart each way. The plants are obtained by digging the shoots that are thrown out late in the season near the "hill." The second season of growth the vines are staked with two redwood stakes, 2 by 2 and 6 feet in length. They are driven one on each side of the vine close in, but spreading at the top to allow for lateral growth and ease in picking.

The raspberries are grown without stakes, and are planted more closely. A good way to plant is, 3 by 8 and allow to make a solid row one way.

The Antwerp raspberry is a heavier bearer than the Cuthbert and slightly more acid. The light, drier and more sweet Cuthbert has better carrying qualities for shipping fresh, but has not proven entirely successful in our locality, from bearing too much second crop in the fall, especially when we have early rains. Evidently the season is too long. At Puyallup, Washington, 750 tons of this variety are raised annually, but their spring is a month later than here in California and the fall a month earlier, and they are not troubled in this way.

The Lawton blackberry and the raspberry were the only bush berries grown until the advent of the loganberry, originated in your neighboring Santa Cruz. This berry met with favor from many, its term of fruiting filling in a gap before the later Lawtons. Its adaptibility to a great variety of soils and climate has given it a wide planting, and its vigorous growth and prolific bearing has made it a favorite garden berry.

The success met in crossing the California dewberry with the red raspberry, the Logan, led to much experimenting, with the result in the past few years of several new varieties. The value of some of these remains to be seen. Probably the next best of these crosses is the Mammoth blackberry, which is in full fruiting at the time the Logans are on the wane and the Lawtons are beginning to ripen. Thus, in our section we have succession of Logan, Mammoth, and Late Black, as we are beginning to call the Lawton since the Mammoth has come into the market.

Another new variety is the Himalya, a strong grower and good fruit, and may prove a good berry in some less favored climate and soil, but so far does not seem to supplant any of the older varieties. I suspect that one reason for this is the quite thorny nature of the vine, but it certainly is a hardy grower and will eventually find its place.

The Logan, Mammoth, and Himalya are running vines, and have to be trellised. This is done in the winter, two wires being used, one above the other, at two and three feet from the ground. The plants from

these varieties are got from "tippings," which means putting a shovelful of soil on the tip of the new growth in the winter, causing it to take root. By spring they are ready to plant. Thorough preparation of the ground and good care afterwards will give the results obtained in all other fruit planting.

HARVESTING AND MARKETING.

The first fruit growers' convention which I had the privilege of attending was in San Francisco seven years ago. In one of the discussions there the Hon. John Markley made this remark, "We have been telling the people in these conventions for the past twenty years how to grow fruit, but from now on we must show them how to harvest and market it."

And these, friends, are the two most important factors in any kind of fruit growing—proper harvesting and then getting the price that will justify the cost and labor of production.

Fruit raising of all kinds has had its ups and downs here in California, where production has been easy, compared to reaching our distant markets, and our berries have been no exception to the rule. In these years of development, or underproduction, overproduction, overconsumption, and underconsumption, the berry business has had as many stages of prosperity as the much-quoted prune.

We have heard, in our district over by the coast, a great deal these past few years of raisin growers' associations, fruit unions, farmers' unions, fruit exchanges, and so forth. This, together with the canneries continually telling us that we were producing more than they could sell only at a low price, until we became infected with the microbe, or perhaps "parasite" of coöperation. Or at least a part of us, for I believe there has never been any community yet where the disease has reached, but what a part of the inhabitants were immune from all forms of contagion.

Those of us who took "it" in the worst form talked coöperation in season and out. This finally resulted last February in the formation of the Sebastopol Berry Growers, Incorporated, under the laws of the State, with a charter which allows us to do anything we might care to do in the fruit and farm-supply line. This happily took place just in time to prevent half of us having our wives leave us in disgust. I wish to say that it is actually appalling, the amount of time and talk it takes to get this virus to work.

We incorporated with thirty out of one hundred and twenty-five growers, secured a manager in the person of a party who had done considerable berry-shipping business, thus securing all the available experience in this line. Our main effort the past season was to get as many of our berries into fresh consumption as possible and thus relieve the canneries. By the time the crop was ready we had increased our membership to eighty. We took up the matter of car-load shipments with Wells-Fargo & Co., who gave us all the assistance in their power, with the result of our sending a representative to the large Rocky Mountain and northern cities, including Odgen, Salt Lake City, Denver, Butte, Montana, Spokane, Seattle, and Portland, and of our dispatching one or more cars to each of these cities. In some of them we did well, and in some we did not, but all the time we were learning, and after the

season was over and the smoke of battle cleared away we found that Wells-Fargo had gotten about $8,000 for transporting our berries, and after all our expenses were paid we had as much or a little more than the man on the outside and our experience as an asset for future business.

Some of the things we found we needed, and succeeded in getting; part this year, and a promise of next were: lower rates, smaller minimum loads, and a better railroad time and connections.

While we are in the habit as fruit growers of laying most of our troubles to the railroad and express companies, there is one thing we must not lose sight of, and it is this, unless our fruit is properly picked, packed and loaded, all the railroad rates and service in the world can not make it arrive in good condition at the other end. This rests with your individual growers and corporation inspection. While some growers think they will lose their individuality by joining an association, they really have a wonderful opportunity to preserve it in this way.

There is no doubt but that coöperation is a remedy for many of our ills. This is an age of combination. But they must be carried on strict business principles, and we have much to learn. We may, perhaps, have to wander in the wilderness until we grow a new lot of men that are willing to give and take and pull together for their own sakes as well as the community, for the prosperity of the community is in a direct ratio to the prosperity of the individual. In the mean time we will have to depend largely on a Moses for leadership. But it does look as though the children of Israel had a pretty good time, even in the wilderness. They certainly did not have to make any bricks for the Egyptians. (Applause.)

PRESIDENT JEFFREY. We will now have the pleasure of listening to a paper by Mr. G. P. Rixford of San Francisco. The title is "The Latest Development in Fig Culture." (Applause.)

MR. RIXFORD. I would like to have it understood, Mr. President and ladies and gentlemen, that the subject of my paper, the fig, is as old as Mr. Dargitz' almond. It figures in the Bible as well as the almond. We don't want to play second fiddle to the almond. Perhaps he is more familiar with the Bible than I am.

THE LATEST DEVELOPMENTS IN FIG CULTURE.

By WALTER T. SWINGLE and G. P. RIXFORD of the U. S. Department of Agriculture.

For the first time in the history of Smyrna fig culture in California, the markets have this fall been partially supplied with home grown Smyrna figs that many experts pronounce equal to the product of the famous fig district of Asia Minor. We say partially, because the quantity offered is not one quarter part of the requirements of even the local markets. The writers know one buyer who never handles any but the best of everything, who wants ten tons of a certain pack put up at Reedley, Fresno County. This particular producer could furnish only about four tons from his young ten-acre orchard. This is certainly an encouraging outlook for the industry, and holds out the promise that when enough such figs are packed to supply the American market, the

million dollars annually paid to the Turks will be paid to the California fruit grower.

The Smyrna is the best of all figs grown in the world and nowhere equaled in the eastern hemisphere outside the limited area of the Meander Valley, a district about 75 miles in length and 10 to 12 miles wide, and situated about 50 miles southeast from the city of Smyrna. The figs of southern Europe, including Spain, Portugal, the south of France, Italy and Greece, as well as the north of Africa, all fig growing countries, have failed to yield a product which for tenderness of skin and delicacy of flavor compares with that of the Adin district mentioned above. It is, therefore, a matter for congratulation, that only in the sunny valleys of California, of all the world, can this delicious product be equaled.

One of the writers recently sent samples of the product of two growers at Reedley and one at Selma to the United States Department of Agriculture at Washington that must have produced a sensation, as a telegram was immediately received to send ten or twelve pounds more for exhibition purposes. The department has taken a deep interest in the establishment of the industry on the Pacific coast, and is evidently impressed with the progress that has been made. In fact, the industry has to a great extent passed the experimental stage.

A VISIT TO THE PRINCIPAL FIG DISTRICT.

At the instance of the department, it was the pleasure of one of the writers two weeks ago to make on extended visit to the fig growers of the central part of the San Joaquin Valley, in the counties of Stanislaus, Merced, Madera, Fresno, and Tulare, where the industry has its greatest development; largely due to the efforts of Mr. Geo. C. Roeding of Fresno. More than a thousand acres have been planted in these counties, more than half in Fresno, most of which have reached the bearing age. There was a twofold purpose in this visit. One was to see the men who are putting up the splendid product, samples of which are here presented for your inspection, and the other was to ascertain the cause, and, if possible, suggest a remedy for the discouragement known to exist among a portion of the growers. It can not be denied that failures have been made and in a few instances bearing trees have been dug up. But it is a satisfaction to be able to say, that with a little time and attention to details, the cause of the failures can be removed.

CAUSE OF THE FAILURES.

With soil and climate well adapted to the industry, it is regrettable that any failures should have occurred. Intimate contact with a large number of growers has impressed the fact upon the writers that the great and paramount cause of failure is an inadequate supply of the fig wasp, *Blastophaga grossorum*. The crop depends absolutely upon the number of this minute, but beneficent insect, that is supplied to the Smyrna trees and upon a sufficient number of good capri trees to support them. Here, then, is the condition of affairs with which we are confronted. Some growers have no capri trees at all, having neglected to plant them when putting out their Smyrna orchards; many more have too small a number and not of the best kinds, while in some instances the trees are scattered about in the Smyrna orchards at con-

siderable distances apart—too far for the trees to properly assist each other in sustaining the insect through the year. Occasionally, a grower is met with, and fortunately the number is very small, who has, perhaps, mistaken his calling in becoming a fruit grower. One such, in speaking of his small Smyrna crop, was asked if he had a good supply of capri figs and the fig wasp. Replying, he said, "there was a good many bugs flying about his place and he thought he was getting his share." It is not surprising that his crops are small.

In that portion of the San Joaquin Valley mentioned, the principal capri varieties are Roedings Nos. 1, 2, and 3. While these varieties are excellent in some respects, others can be added to the list that will give much value to the whole. Some think that No. 1 is the best of the three, and it is valuable in producing an early profichi or spring crop. No. 2 seldom bears a mamme or overwintering crop, though an abundant profichi crop, and must therefore be planted where it can be fertilized by other capri trees. No. 3 generally carries a fair mamme and a good profichi crop. As some capri trees fail to produce all the crops required for the support of the blastophaga through the year, it is recommended that several varieties be planted, that they may fertilize each other and thus with more certainty furnish an abundant supply of profichi wasps in early summer when required by the Smyrna trees.

THE MILCO CAPRI.

Among the most valuable capri trees is the Milco, named after the late G. N. Milco of Buhach fame. This tree has been under observation by one of the writers for some years in widely separated localities and under varying conditions of soil and climate, and he has never found it to fail to carry an abundant mamme, a fair mammoni and a large profichi crop. As a striking evidence of the value of this variety it may be mentioned that a number of old trees, giants among their fellows, have been found that have carried the insect unaided by the proximity of other trees, for forty years. Some growers rely on this variety alone and never fail to have an abundance of fertilizing material. While being one of the earliest producers of profichi figs, it is also one of the latest, and possesses the virtue of giving a steady succession of profichi from the beginning to the end of its season. Most capri trees when under five years of age fail to carry an overwintering crop, but the Milco is one of the most precocious in this respect of the whole list under observation. This tree, then, with our present knowledge of the hundred or more varieties now in cultivation in this State, is confidently recommended as one of the most desirable to plant.

HISTORY OF THE MILCO CAPRIFIG TREE.

In this connection it may be of interest to give a brief history of the first introduction into this country of the caprifig tree and the blastophaga. On the ranch of Samuel Gates, 10 miles west from Modesto, stands an ancient capri tree about 45 feet high with a spread of branches of 40 feet and a trunk 8 feet in circumference just below the branches. The tree was planted in 1867 by Lewis Adams of Stockton, who purchased it with other trees from the late W. B. West, an enterprising and intelligent nurseryman of the same place, well known to many of the older fruit growers of the State. Of these old capri trees, of which the Gates is one of the oldest, more than fifty have been located by one of the

writers. About thirty are growing in the vicinity of Ripon, two near Lathrop, seven at Stockton, and about a dozen near Milton. Some of these trees are about as old and about as large as the Gates tree, and we have positive proof have carried the blastophaga for about forty years. A number of them have been traced directly to the West nursery and as they are all of the same variety, there is little doubt that they all came from the same source.

It was supposed that the fig wasp was first sent to the new world from Algiers by one of the writers in 1899, but the discovery of the insect on the Gates and the Lathrop trees, proves that the first introduction antedates that of 1899 by more than thirty years. A question of much interest in connection with the Gates and Lathrop trees is, how did they become infested with the blastophaga. W. B. West probably imported more fig trees than any other man in the State. In 1865, two years before the Gates tree was planted, he imported twenty-two varieties from the south of Europe by way of Panama, the first overland railroad not then having been completed. As it was possible only for the insect to be brought over in the caprifig itself, it is reasonable to suppose that the trees imported by Mr. West carried mamme figs containing the insect and that it was established in the Stockton nursery before the trees were distributed. As all these old trees are of the same variety and most of them are known to have come from that nursery, it is a reasonable conclusion that to W. B. West belongs the credit, though probably unknown to him, of having first introduced the blastophaga into America. That caprifigs on trees or cuttings could retain their vitality long enough to make this possible has been proven by one of the writers who took cuttings with mamme caprifigs attached from trees in the Maslin orchard last December and planted them in his yard in San Francisco. In May following the wasps were alive and about ready to issue, but a spell of warm weather in June dried up the figs and killed the insects. This shows that even on unrooted cuttings it is possible to keep the insect alive for six months. This introduction by Mr. West was undoubtedly accidental. The late Mr. Fred West, cashier of the Stockton Savings Bank, was at the time of this importation a partner of his brother in the nursery business. He said to one of the writers, just before his death, less than three months ago: "If we imported the capri tree and the blastophaga, it was purely accidental, as we knew nothing about either the capri tree or the insect, but thought we were sending out a choice variety of the Smyrna fig.

CUTTINGS AND CAPRIFIGS AVAILABLE FROM THE LOOMIS ORCHARD.

At the Maslin seedling fig orchard at Loomis, Placer County, which is under lease to the United States Department of Agriculture, are several very desirable capri, as well as a number of choice trees of the Smyrna type. These capri trees have now been sufficiently studied to enable us to select a half dozen or more of the very best. They are vigorous trees, producing mamme and mammoni crops in sufficient abundance, and above all enormous profichi crops of large figs, abundantly infested with blastophaga and having plenty of pollen. The resources of this orchard, both in caprifigs and cuttings, are placed at the disposal of all who are interested in fig culture. Cuttings from the best trees without cost and caprifigs at the bare cost of gathering and shipping will be

supplied when requested. Any one desiring either the fruit or the cuttings has only to send his name to the writers at 1813 Pierce street, San Francisco, and he will receive blank applications and circulars giving the conditions of the distribution. Last winter nearly ten thousand cuttings and seedling trees and last spring several hundred boxes of mamme and profichi caprifigs were distributed. This winter and next spring further distributions of the most desirable kinds will be made.

PLANTING CAPRI TREES.

Every grower should aim to have an independent supply of fertilizing material of his own. This can be done only by planting a number of varieties of the best capri trees proportionate to the number of Smyrna trees in his orchard. If he has old trees of any variety he deems undesirable for any cause, let him insert capri grafts of the best kinds and by this means supply himself much sooner than by waiting for young trees to come into bearing. Smyrna trees will show some fruit as early as two and three years, and which, if caprified, will come to perfection. It is recommended that capri trees at the rate of two to each acre of Smyrna trees be planted by themselves in one corner of the orchard, or if there is a knoll or spot reasonably free from frost, put them there. They may be planted as near as 20 feet apart and if sheltered by a wind-break to keep off cold winter winds, all the better. A number of growers may combine and plant a tract to capri trees in a sheltered spot even at some distance from their orchards, if thereby they can secure protection from the hardest frosts and also obtain earlier profichi caprifigs in readiness for the first Smyrna figs that reach a receptive condition. There is no danger of an oversupply of caprifigs, for there will always be a demand for the surplus from growers who have from some cause an inadequate supply. In the fig districts of Asia Minor, where fig growing has been a great industry for thousands of years, caprifigs are a regular article of trade in the markets. The reason for planting capri trees apart from Smyrna trees is that they more effectually fertilize each other and that a more even distribution of the caprifigs may be made by hand among the Smyrna trees. The question is often asked: Why not plant the capris among the Smyrna trees and let nature take her course? In Asia Minor it is firmly believed that overpollination is the cause of the splitting of figs. The writers do not believe that this is the sole cause, if a cause at all of the trouble, for reasons that will be given further along. It is not desirable that more than one or two blastophagas should enter each Smyrna fig. At Loomis, where at times the insects are seen hovering over the trees like swarms of gnats, it is not unusual for a dozen to enter a single fig. One of the writers has counted as many as twenty-five wasps in one fig and another struggling mass of fifteen at the entrance trying to get in. Capri trees planted at considerable distances from each other in the orchard receive very little help from other capri trees in carrying the insect from crop to crop, and when the tree is of a variety that carries no mamme crop its profichi crop is likely to be a failure. It may be noted that the more accessible the figs to be caprified are to the blastophaga, the more of them will be entered. In some instances we know that the wasp has fertilized trees some miles away, perhaps carried by the wind, but not in sufficient numbers to produce a crop.

THE SPLITTING OF FIGS.

The past season is reported everywhere to have been an ideal one until the September rains came. These were followed by cool, damp weather, with considerable splitting and souring of figs. It is the sentiment of many growers that splitting is caused by cool, damp weather and not by overpollination, nor excessive irrigation. One of the writers has seen trees growing on the banks of an irrigating ditch, in which water was flowing a good part of the year, and the fruit on these trees split no more than on trees in other parts of the orchard which were irrigated only twice during the season. One grower, however, speaking of the large size of the figs on these trees said he would rather have some splits than small fruit. One large Smyrna fig orchard planted on ground so moist that a drainage canal is being constructed through it, showed very few split figs. Certain trees and some varieties, the White Adriatic for instance, split worse than others. In the Maslin orchard are trees with fruit that split more or less every year, while others, equally surrounded by capri trees and swarms of blastophaga, show no splitting at all. Location seems to have something to do with it, as in Fresno County in those orchards near the foothills the trouble seems to be less prevalent than out in the valley. The past season in most localities has been the worst in several years, still it is not a very serious matter. It is noticeable that of the Lob Ingir many split specimens close up in drying and still make good figs. This fig contains so much sugar that, unlike the White Adriatic, very few sour even when split. It is at present difficult to account for this trouble in many cases and the subject should have further study.

CURING FIGS.

It is well known that when the Smyrna fig is perfectly ripe and nearly dry it falls to the ground. It is likely that most growers will find it less troublesome and about equally profitable to sell the product to the packing houses as soon as sufficiently dried, rather than attempt to gather around him the necessary labor and appliances to put his fruit into elaborate packages in order to secure the highest price.

A few suggestions, some of which represent the experience of the growers who are putting up the best figs now on the market, may not be out of place at this time, and may be of service to the inexperienced. One of the most important details, though troublesome, is to gather the fruit from the ground very often, in fact as often as every other day. This will in a great measure prevent the entrance of beetles that lay their eggs and make wormy figs. Another important consideration is not to dry the figs too much. If too dry the seller not only suffers loss of weight, but also injures the quality, as overdried fruit must be processed before it can be packed. When the figs have become sufficiently cured they are still pliable, yielding to a slight pressure of the fingers. In very warm weather the smaller figs are sufficiently dried when they fall from the tree. The larger will require exposure to the sun on drying trays for two or three days. After the figs are sufficiently dried they are rinsed in clean water to remove any dust or dirt that may have adhered to them, and are then exposed to the sun long enough to remove the surplus moisture. After grading as to size

they are put into sweat boxes and are pressed down into a solid mass, where they remain a week or ten days to undergo a sweat. This treatment is a very important part of the curing process. The overdried fruit absorbs moisture from the underdried, softens the skin and is a decided benefit to the whole. In this condition the figs go to the packer. In order to kill germs or the eggs of insects that may have been deposited in the figs while exposed under the trees or on the drying trays, some packers expose the fruit to hot steam for a few minutes, while others immerse it in boiling brine, made with three ounces of salt to a gallon of water, for two or three minutes. In curing the figs exhibited here no salt was used. After this heating process the figs are soft and pliable, and are then split open from stem to apex and spread out in layers and pressed into bricks of a pound or half pound in weight, and are then either wrapped in waxed paper, like those before you, and the bricks packed into 25-pound boxes, or are first put into fancy cartons and then packed into boxes of various sizes.

It may here be mentioned that certain varieties of trees produce figs that may be called self-sealed, the eye being stopped by a drop of hardened syrup or pellucid gum that effectually prevents the entrance of filth beetles and other vermin, and thus assures figs that will not get wormy without the scalding process. Cuttings of this variety will be available from the department distribution mentioned above.

CONCLUSION.

While the production of the finest figs requires some attention to details, such as the care of the capri trees and caprification, not necessary in growing other fruits, there is nothing in the work not easily mastered by laborers of average intelligence, while the fig tree possesses compensating advantages. The crop is never lost by late spring frosts, the tree requires little pruning, no spraying and no thinning of fruit, which means a saving of labor fully equal to that required in caprification. The prospective fig grower need not, therefore, be deterred from entering upon the industry for fear of troublesome details, while he can be assured that when his trees are five or six years old and in suitable soil and climate, they will bring him a gross income of about a hundred dollars per acre at present prices, with a steady increase for a generation to come. (Applause.)

MR. MARKLEY. I want to say, up in Sutter County the Calimyrna grows very well and sets heavy crops, but we have not been able to ripen many figs. We have Roeding Nos. 2 and 3. No. 1 never has anything on it to amount to anything. No. 3 has a very large profichi crop. What we want is a caprifig that ripens the crop ten days earlier than Roeding No. 3.

MR. RIXFORD. It is a question whether we have capri trees that fruit early enough for your purpose. The only way I have seen it done is to plant the capri trees in some very early locality.

MR. MARKLEY. I want them later. It ripens before the Calimyrna and drops off.

MR. RIXFORD. You can get caprifigs from the vicinity of Modesto and Turlock and Ripon where the insects do not issue nearly as early as they do at Fresno, and if you want them still later, those grown at Niles—this year they did not issue until the 25th of July.

MR. MARKLEY. The climate of Niles is so different.

MR. RIXFORD. Still, the insect flourishes there.

MR. MARKLEY. If I took a Niles tree to Sacramento Valley it would change its habits.

MR. RIXFORD. We are giving a good deal of attention to that matter of varieties and trying to select a list of caprifigs that will give a succession. We now have a list that will give a succession for three or four weeks. The Smyrna fig continues to push its crop for four to six weeks. Of course, the latest ones, if they are caprified, perhaps would be too late to escape the fall rains, but the crop can be very greatly increased by having the caprifigs at various times. The men best posted, in sending to me, say, send 50, four or five days apart. The reason is, to-day there may be a certain number of Smyrna figs in a receptive condition. A week later there will be another lot, but in the mean time the first caprifigs have dried up and the insects are dead, and that is the reason why a succession of the caprifigs is important.

PRESIDENT JEFFREY. I am going to take the liberty of calling on four old members of this convention before noon. I am going to ask Mr. E. W. Maslin to speak five minutes on seedling fig orchards.

MR. MASLIN. *Mr. President, and Ladies and Gentlemen:* I am suffering from a very severe cold. I have very little of importance to tell you or to add anything to the knowledge of how to grow a Smyrna fig. I suppose my worthy Commissioner simply wants me to tell you how I grew the Smyrna fig and what induced me to do so. I have about twenty or thirty varieties of figs in my orchard at Loomis, and conceiving the idea that I could grow a Smyrna fig, of which there were none at that time, I knew, in the State, I wrote to Mr. Thurber of New York and asked him to send me a box of Smyrna figs. He sent me the Imperial figs, which I put out in 1886. I formed a nursery and put out fifty-three trees in the vineyard orchard and about 15 acres in the flats. The flats were destroyed; I destroyed them myself. Every tree, nearly, had a different variety of fig and leaf. One year I raised one tree of a purple fig which ripened. My notes seem to state what was not true, that I planted the south part of it with figs from San Francisco. Those were planted with the best figs I could buy in New York, for which I paid 30 cents a pound. These figs were grown without irrigation; I had not the facilities for irrigation. Some time in 1900, I went out to Mr. Shaw's place. At that time I did not believe in caprification. Gustav Eisen insisted all the time that I could never raise figs without the wasp. One day we went out to Niles and found two or three caprifigs. They had plenty of pollen. We took the pollen out in my hand with a toothpick and put it into one of the figs imported by Mr. Rixford. We raised fifty figs. Mr. Shaw then wrote to Smyrna and got out a lot of Smyrna figs. I put them in the orchard in little boxes. Not being an entomologist I did not know how to take care of them. Mr. Eisen, from Lower California, sent me half a dozen boxes of the blastophaga. I put them in the trees and I think either from the California or the Mexican or the Smyrna came the blastophaga in that orchard. I was so unfortunate later as to have to surrender my ranch to Mr. Gage. It was due to Mr. Swingle and Mr. Rixford to recognize the value of the orchard. So far as I am concerned, my effort was to grow the Smyrna fig through the blastophaga and the seedling. I was a sort of a pioneer without much knowledge of the question. (Applause.)

MR. RIXFORD. With Mr. Maslin's permission I would like to make a correction. It was in 1883.

PRESIDENT JEFFREY. Mr. Kohler of Selma has been asked to speak on curing figs.

MR. KOHLER. I am in a peculiar position. I am a good deal like this gentleman that has just spoken. I did not know much about it and have been trying to learn, and when I run across such men as Mr. Rixford I find that I have learned a whole lot that is wrong and I don't know what is correct. But I raised a few of the figs this year, and after I put them in the sweat box my wife was looking over some one day and she found a number that were sealed up. I saw the one that Mr. Rixford had last year; and the wax had come out and seemed to drop over, but this was sealed up and looked transparent. I forgot to send them to him and I don't know what trees they came off of, but another year I will observe closer and watch for those trees. I cured some, and I believe in the pure sunshine and no dope on them. When they drop off they get a little dirt and I wash them in cold water with a very little salt. I imagine that the salt gave them a bright, glazy color, and then to get them in the proper condition I put them in the oven, and the oven I had 125 degrees hot, and kept them in there four or five minutes and packed them. They told me my method was impracticable and I told them it was not, because I could fix an oven and a dryer just as easy as they had it on a carrier going through hot liquid. There was a Swiss-Italian that gave me this idea, and he told me that if there was anything that he understood thoroughly it was figs and oranges, and he told me that the figs that they packed in New York they used a sort of an acid and they had an acid taste to them, but Mr. Rixford tells me the good figs are not thus packed, so he must have been wrong. I have been buying caprifig trees for three or four years, and I have got all kinds of trees. I don't know what they are going to bear, but I have got all kinds of shapes and all kinds of trees. It is something I don't know much about. (Applause.)

MR. RIXFORD. There is about one fig in fifty, generally, that is self-sealed.

PRESIDENT JEFFREY. Mr. Elmore Chase will speak on our trade in Smyrna figs.

MR. CHASE. The undried figs. I have not done any very big business in that matter; I am just starting in the business. Mr. Rixford has helped me considerably. I bought, something like ten years ago, twenty-five figs from Mr. Roeding, and he sent me two caprifig trees and one of them has borne figs, but I don't get any blastophaga, and this year the caprifig tree has raised a large number of mamme but they all dropped. I received a large number of the profichi figs from Loomis. We hung them up in our trees and even had a very good crop this year, but the later ones did not fertilize. By the way, my figs have been fertilized for four or five years, and I don't know how they were fertilized. I have had a fair crop for several years without the insect. I wrote to Mr. Roeding about that. He said, "Send me some figs." I sent him some and he said, "You are fortunate. The bugs are about you somewhere." I took the figs, some two or three hundred pounds, this year from a few trees. We made a weak brine, dipped them in

the brine hot and then cut them open—I can't explain just the process, as my daughter did it—and packed them in fancy boxes and carried them to Sacramento, and they had never heard of these figs before and it was hard work to get started. When I got started they sold rapidly. I sold most all of my Smyrna figs just as I picked them from the tree, carried them right down there and sold them green. In this way I have created with the Smyrna fig quite a demand from one firm, and they told me, "Next year we can sell everything you raise; the demand for them is great." Another process I took with the Calimyrna fig was to dip them, what we call candying them, in hot sugar and let them dry and dip again. The process lasts several days. Those bring as high as 40, 50 and 60 cents a pound, and that supply we sent down there went so quickly that they wanted more, but we did not have them.

PRESIDENT JEFFREY. I think the most remarkable thing about this entire discussing is that after thousands and thousands of pages have been printed in trying to discover who introduced the blastophaga—as much as has been used in trying to discover who hit Billy Patterson—now we find a pioneer, Mr. Rixford, who discovers that it has been here forty years. That discovery is not so remarkable as the fact that Mr. Rixford had the courage to say that all these discussions we have had for years have been a mistake, taking away credit from his own department and from a great many other men. I don't know how to account for this candor on Mr. Rixford's part in any other way than because he is a California pioneer. Now, Mr. Berwick has a few words to say.

MR. BERWICK. I have to catch this next train and I was just going. I was telling you yesterday that we had a grand opportunity of doing something. We have talked a great deal for five and a half years and this year our treasurer, Mr. John S. Dore of Fresno, is willing to help us out by going to Washington, and he is a man of some stir. I am tired of hearing people say, "Oh, it will come." Did you ever know a fig tree to come—even a barren fig tree—unless some one planted it? Did you ever know a house to get built unless some one built it? And if you want parcels post to help your fig business you have to do something. Mr. Dore is here and he will tell you what you can do, and I trust that you will be ready to do something more than talk at this time. Will you permit Mr. Dore to take my place?

MR. DORE. *Mr. Chairman, Ladies and Gentlemen:* I just came in your hall a few moments ago. I had no idea that my friend Berwick was going to thrust this upon me. The question, I see by the press, was mentioned yesterday, and my name has been connected with it just now, and I can tell you very briefly what I propose to do. When the Farmers' Union, a State organization, met in Fresno a few weeks ago I was selected by the State organization a member of the National Legislation Committee of that body, and one purpose in my selection was to push the parcels post, as we adopted very strong resolutions there, and because of that, perhaps more than any other thing, I was chosen.

Now, some say that little can be done here or at Washington; that

we can pass resolutions and go home and come back next year and pass resolutions again. As Mr. Berwick has told you, for five or six years we have been doing that. We have made progress in the enlightenment of the people; we are more solid with the people, the producing classes of this country, because of the agitation, but we are not making much progress toward the establishment of a parcels post. The plan I have in view is this. A few years ago I met with the National Grange at Rochester, and this motion for the first time was adopted by that conservative producers' association, numbering over 800,000, and from that day to this the parcels post has occupied a conspicuous place in the national meeting of that great organization. Every state grange and all of the local granges and every paper of that organization—and there are many of them—have pushed it vigorously for the past five or six years. As I said before, it is a conservative organization, but after it has once planted its standard along that line it takes no backward step. The work for the rural delivery and for many other national movements has been pushed, and persistently, by that organization. As a result we have marched forward. The Farmers' Union, which has between two and three million people, largely in the Southern States, has adopted the same idea, and California, perhaps, was as vigorous as any in that line. During the sessions of congress the National Grange for many years has maintained a legislative committee, and a good share of the time it is in session in Washington; they have met with the President and the members of the cabinet, and before committees of congress they have not had a respectful hearing when they have asked to be heard. What I propose to do is this. I propose to meet, if I go to Washington, with the committees of the Grange and the Farmers' Union. I am personally acquainted with the men, or most of them—all of them on the Grange and most of them in the Farmers' Union. We will agree that we can push the parcels post along intelligent lines. And what are those lines? First, we will have compiled from the Congressional Record at the present session of congress, both senate and house of representatives, the action of every member upon every question relating to the parcels post, and publish that information in every congressional district in the Union. Aren't we making progress when we do this? I think so. And there is no combination of capital, no combination of interests that are antagonistic to this parcels post that can hinder our doing this, and we will place within the reach of the people of this nation exactly what we want, and we will show who are favoring the things that the farmers are calling for. I have yet to find any state or national grange, any state or national farmers' union, a single man or woman, to raise a hand or voice against this great convenience and great necessity of our civilization, as it has been in other countries, and, therefore, I say that when we have a concrete plan of operation that shall mean something and that shall tell our people who are their friends and who are careless or antagonistic or indifferent, we will have made progress. The question is as to doing it. It is with some degree of hesitancy or delicacy that I stated to my friend Berwick the situation. The Farmers' Union appropriated $250 for my expenses, but they did not have the amount in the treasury. There was a misunderstanding and it has come back to the National Convention, and then the question came up

whether we should be there or not. The master of the National Grange, ex-Governor Batcheller of New Hampshire, has pushed this matter earnestly. More than one page of his speech each year in his annual message has been devoted to the parcels post, and in the discussions it has occupied a larger space than any one question for four years. Ex-Governor Bell of Vermont, another member of the executive committee of the National Grange, is also in line and working and has worked, and while occupying the position that he has in the grange, has missed no opportunity to push to the front in an effective way the demands of the producers of this country for that great convenience. Aaron Jones of South Bend, Indiana, another member of that committee and past master, is a sterling farmer who visited California and spent some time at my home. I have had frequent correspondence with these gentlemen and we have exchanged views in regard to this question, and I tell you that there is no reason why the farmers and the fruit growers of California shall not make their voice heard, and I tell you when the representatives of those two organizations, through their legislative committee, stand before the committees of congress, when they stand before the world, publishing the name of every man there, and no man has any right to question or dispute the right of the people to publish the record. Let the people understand this and it will right itself in a little while. There will be no injustice, there will be no wrong done any member of congress, nothing that is unfair. On the contrary, it will save them from misrepresentation and from any and all wrongdoing on that side of the question.

I have occupied more time, Mr. Chairman, than I should. I had no thought of speaking at this time, but I will offer, before the close of the meeting, some resolutions touching this matter and voicing, as I hope, the sentiment of the fruit growers of California upon this subject. (Applause.)

A recess was here taken until 1.30 o'clock P. M.

AFTERNOON SESSION.

The President called the convention to order at 1.30 o'clock P. M.

PRESIDENT JEFFREY. We will now have the pleasure of listening to Mr. Ashley on the subject, "San Joaquin County Grape Growers' Association." (Applause.)

MR. ASHLEY. *Mr. Chairman, Ladies and Gentlemen:* I want you to be a little lenient with me. I am not a public talker. As to my subject, I want you to be a little lenient on that, because while I have been growing grapes nineteen years, we have only been in this work one year. There are lots of things we do not understand. If there is anything in what I say that seems to be at all out of the way, understand it is from a grower's standpoint and nothing personal is intended.

CO-OPERATION FOR THE BENEFIT OF THE PRODUCER.

By George W. Ashley, of Stockton.

Organizations, associations and corporations without number have been formed and are still being formed for the benefit of some one. The greater number of these go to pieces on the rock of adversity. In those that are successful the smaller stockholder or member is usually frozen out and the profits go to the few. With few exceptions those that are successful are conducted on a commercial basis and the profits are divided up according to the number of shares of stock held by their fortunate owner and not according to the products handled for the party that grew them.

In a list of the few exceptions to the above rule and getting down to those of closer interest to the fruit growers are such bodies as the California Fruit Growers' Exchange of Los Angeles, the Hood River Apple Growers' Association of Oregon, The Yakima Fruit Growers' Union of Washington, The Georgia Fruit Exchange of Georgia, The Southern Texas Truck Growers' Association, and several others. These have for their chief object, not how large a per cent they can pay on their stock, if they have any, but how much per box they can return their members for their fruit? How cheap they can buy their supplies for their members? How well they can watch legislation, both state and national? How they can better distribute their products? How they can open new markets, and first, last and all the time how good a box of fruit they can put up? The time has gone by when the fruit grower can work under the old Roman maxim of *caveat emptor*, "Let the buyer beware." The one for the future will be, "The seller must make good." The chief road to prosperity for every successful fruit organization will be good goods. *Make the brand good in every market.* Fire out the careless and unreliable grower or else have your contracts so ironclad he must come through with good goods. So much for fruit organizations in general.

Now for our own experience in the San Joaquin County Table Grape Growers' Association. There were several causes for the starting of our association. One of these, and I may say the chief one, was the fight by the importers to reduce the tariff on the Almeria grapes. You all know the result of this fight by which the tariff on foreign grapes was raised 25 per cent. This was accomplished by our congressman, more as the result of the action of a committee appointed by the State Fruit Growers' Convention of two years ago, than to the action of any one else. We may, however, all have helped a little. This question, however, called together the grape growers of our district many times and resulted in the formation of an association.

This association held quite a number of meetings, and discussed whether it would only work along the lines of legislation, cheaper supplies, and a better pack, or whether in addition it would conduct a general shipping business. Finally, the more radical element won, and it was decided to undertake all things connected with the picking, packing, and marketing of grapes. When this decision was reached, it was thought best to change from an association to a corporation. This was done, but we still retained our association name.

In order to carry out our aims we knew we should have to have

money. How to obtain this was the question. In order to allow the smaller grower to come in and feel protected, our shares had been placed at $25 per share, payable in five annual installments. The number of shares had been limited to one for each person. Therefore, to get money we knew we would have to borrow it. We decided to adopt a marketing agency and get our funds from them. On the question of a marketing agency our board of directors, and also our members, were pretty well divided up, and possibly here we made our first mistake of adopting two firms doing business in the same territory as our agents. But we did this. With our selling agents adopted we were enabled to get money for our members to buy their supplies of shook, sulphur, nails, etc., at a reasonable figure. The majority of our growers had paid 12½ cents for shook and baskets two years ago and 10½ cents one year ago. They wanted it cheaper, and by getting together and buying one half million in a bunch we got a much lower figure. In this one item we saved our members between five and ten thousand dollars. In labels on the number ordered we saved from $750 over their price in small lots. In sulphur we bought so cheap that more than one store asked us to buy for them. Nails we got at bedrock prices.

We secured money for those that needed it at a very reasonable rate of interest. We built two good sized packing houses and one smaller one. We did not require all of our members to pack in these, as we regarded them in a way as experimental. Instead of running them ourselves at first we let the contract to a firm at a fixed price under a heavy bond to run them and load our cars. This may or may not have been a mistake. We ran them ourselves the last part of the season, and the majority of our members will insist on this way next year, though whether it will be by the crate or by the time taken to pack a crate I am unable to state. The greatest objection to a fixed price per crate for packing is that the grower with good grapes and the careful picker has to pay for more than his share.

Our work this season has shown conclusively that only by the closest inspection can you secure a reliable pack of grapes and this inspection is much more easily secured at a central packing house than otherwise. For while the majority of members are honest, conscientious and fair, in the minority are some who do not possess these qualifications and a few who are actually dishonest. These few will kill your brand. You can not carry out your motto of "Make the brand good in every market," with these few putting in undesired, improperly picked, culled or packed fruit, handled carelessly. To have an inspector present at every growers' packing house is impracticable. We had at our busiest time four outside inspectors and two house inspectors, and they got so they could turn a crate upside down and take the baskets out in a scientific manner. In addition to these, we had our own man in the East to report on the packs and condition on arrival, etc.

As some remuneration for what we have done in this line we have received several encouraging letters, one of which says, "For a number of seasons past the Lodi pack of grapes has been gradually deteriorating. In nearly all markets there was a prejudice against the shipments from Lodi and a preference shown to some of the other points on account of the more careful grading and packing. We know it has been the object of your association to improve the pack, and we are pleased to

note that considerable has been accomplished along these lines, and a good deal of the prejudice has been eradicated. We feel confident if this work is continued it will only be a question of a little time until Lodi will stand at the head of the list."

All of this inspection had the effect of shutting out many cars of inferior grapes. Not as many as we should have shut out, but quite a considerable number, at least 50, possibly 100. In comparison to this, we of the Lodi district had the same old game to contend with of the commercial companies accepting any and everything offered in the shape of a crate of grapes. And here we take occasion to say that our association might never have been in the shipping business had these same commercial companies ever shown at Lodi any disposition to inspect or hold down the poor f. o. b. pack. Their system in the past has been a premium for a poor pack. We are pleased to note there is some disposition to remedy this next season.

Returning to our marketing agencies: With one of these, Denney & Co., we made a contract by which they were to receive as their commission, not a flat rate per cent, but so much per cent above the auction charge in the East. Our reason for this was that the auction charge varies a great deal in different cities, and we thought possibly we would get better distribution if our agent received the same per cent no matter to which city he sent our cars to instead of getting 5 per cent net in some large city and 2 per cent in some small one. We believe that this system would greatly aid distribution if adopted by others.

Under the present systems, our organizations find that growers' fruit is sometimes used (and I may say quite often) to fight other people's battles with, the grower receiving no advantage thereby. If the different firms wish to fight, why not use their own fruit? Our instructions to our principal agent, Denney & Co., was that if any one wished to fight to let them fight, but to keep our fruit out of it, to only drop them when other people had already dropped. Otherwise go to auction. In connection with this, however, Lodi district and our organization in particular wishes to give notice to the various other districts and the various commercial companies that another season we are not going to sit around the first part of the reason while prices are good and let some other f. o. b. district drop its prices 10 cents per crate for a whole week, as was done by one district three times this season while Lodi held an umbrella over it. Whenever it is necessary to drop the price, it must be for the whole Tokay belt.

As an association there is a situation that we realize we have got to meet. It is the marketing of 10,000 cars of table grapes from California. This to be done in the same market and at the same time that they are marketing 10,000 cars of Michigan, New York, and Ohio grapes, Washington and Idaho prunes and Eastern and Colorado fruit, all under present conditions to be used up in a short time. This can best be done by organization, whether it be the getting together of the various commercial companies or whether the growers are forced into a growers' organization.

We have got to get our grapes on the market for less money, and we have got to get some way of extending the marketing season. I do not mean for less money than has been received by the grower this year,

but at less cost with better distribution and with fewer rejections. At less cost, I said. Our freight and refrigeration charges to some points are exorbitant. The railroad tells us that one reason we have to pay so much freight is because they have to bring the cars back empty. Now, if this is a fact, why did our association have to refuse to load cars that were so strong with carbolic acid, salt fish and smoked meat we were afraid to put grapes in them? Why did we load numerous cars that had been previously loaded with cement, merchandise, and provisions? At less cost, I said! Why should we pay the same freight charges to Salt Lake and Denver as to Chicago? It is less than halfway. Why the same freight charge to Salt Lake and Denver as the orange grower pays to New York City? Why the same refrigeration charge to Salt Lake as to Denver.

Now, consider distribution from two sides, one of getting of the fruit into more cities, the other the act of not getting too many cars into the same city. Without better organization this can only be remedied to a small extent by the exchange of billings and divisions. The rejection of cars by buyers because the market has gone against them should be reached in some manner, and can only be reached by organization of some form. For if one firm has a car sold at 65 cents per crate and about the time it arrives another firm comes along and offers one for 45 cents, the commission firm that bought at 65 cents is very apt to ask for a reduction on account of some fly speck he has found.

With these 10,000 cars of grapes to market our association realizes that we have got to give up the idea of fancy prices, especially from young vines and from some localities, and be willing to put our grapes out in the West and Mississippi River country at a price based on a reasonable rate of interest, on a reasonable investment with a reasonable freight rate. Under those conditions we would open up new markets, send the Eastern grapes back where they belong, and by only putting our choicest grapes in the far East we would make some money for all. But we can not pay $346.50 freight and refrigeration for a 1,000-mile haul and do it.

One thing our association learned is that in many of the auction markets the receivers, when the markets are bad, bid in the grapes for the companies they are acting for. There is no question but what this has a tendency to steady the market. But this same receiver by taking the chance will in nine times out of ten make five times as much as the grower does who has spent a year raising it. If a large organization had its own agents to cut up these cars it would add quite a sum to the growers' profit. The danger now of putting car loads into small cities is that half a dozen others may do the same thing and the market get demoralized, the fruit old, and everybody disgusted. The distributors' organization of Sacramento has done much towards distributing the fruit properly, but it does not go far enough. It should control the f. o. b. price of its different companies in all the districts it buys in and it should have some form of inspecting, and stand only for good goods. As long as the distributors do or do not do these things, and as long as the majority of the independent companies are price cutters, it looks as though the growers themselves, through a state organization, would have to take these various matters up. The orange growers of the south had to do it; the Georgia peach growers

had to do it; the Oregon and Washington apple growers had to do it, and why should not the grape and fruit growers of northern California do it? Why should they pay large sums as dividends on stock held by fortunate individuals? Why should they have to pay exorbitant prices for shook? Why should they have their fruit selling through half a dozen agents in a town, cutting each others' throats? Why should there not be some form of inspection by which the poor fruit is kept at home? Why should there not be some organization of grape and fruit people to work with various other organizations in other lines to have some effect on legislation and rates? Why should there not be some organization to put into effect in a commercial way the storage of Emperor grapes for later sale and keep them out of the way of the Tokay? Why can not we have some coöperation for the benefit of the table-grape producer?

We, of the San Joaquin County Table Grape Growers' Association, have tried some of these in a small way, and have been reasonably successful. Why can not other districts do the same and then all get together under some central organization, no matter what its name is?

I said we have been reasonably successful. We shipped some 300 cars, and would have shipped five or six hundred had it not been for the poor prices and early rains. We sold grapes in thirty-seven different markets in car load lots, besides shipping to numerous towns in small lots. We shipped grapes from the Sandwich Islands to Florida, and are ready to compare prices with any one of the same grade of fruit.

We do not claim that we have not made mistakes. We have made them. Some we have rectified. Some we will not make again, others we may make in a different form. Still we are hopeful, and buyers are beginning to ask for our pack, and over 250 of our members have signified their intention of going on next season.

One thing we are ready to do, and that is to coöperate with any one that we believe can help in any way to increase the amount received and lower the amount of cost to the grape and fruit grower. I thank you. (Applause.)

MR. STEPHENS. I would like to ask one question. How many members are there of your association?

MR. ASHLEY. There are over 250 paid up for the next year already.

PRESIDENT JEFFREY. The Committee on Seeing the Valley has asked me to have you pass upon the program for to-morrow. The committee does not think it will be possible, owing to the rain, to make that excursion, and yet they do not want to call it off without the authority of the delegates of the convention, and if you feel that it will be a failure to try and get around to-morrow in the mud, and the committee feels that way, I would like to entertain a motion that we cut that out of the program to-morrow and use the time in convention.

MR. DARGITZ. I make a motion to that effect.

The motion was duly seconded and unanimously carried.

PRESIDENT JEFFREY. The next thing on the program now is the report of the California Fruit Distributors, by Frank B. McKevitt, the manager of the organization known as the Californa Fruit Distributors. (Applause.)

REPORT OF THE CALIFORNIA FRUIT DISTRIBUTORS.

By F. B. McKevitt, Sacramento.

The fruit season of 1909 is distinguished from all others by the fact that never before in the history of the industry has the movement of fresh fruit to outside markets been of such great volume, 15,265 car loads having been shipped, nearly 2,400 more than in 1908.

It might be inferred from this heavy shipment that the deciduous fruit crop of the State was unusually large, but this would not be true, the crop of some varieties and of some localities having been quite short.

Last year the crop was very heavy, and owing to the season being comparatively dry, there having been practically no spring rains, the fruit did not attain full size, and trees especially showed the effect by a lessened growth and poor bud development. This was true more particularly in the localities where irrigation is not practiced, but to some extent was the case almost everywhere in the Sacramento Valley. In the spring the setting of fruit showed an almost total failure of apricots, light crop of cherries, and a half crop of peaches, pears, and plums. Owing to the abundant rainfall, fairly satisfactory cultivation, and the fact that the crop was short, it was estimated that we would be safe in providing for an output of these varieties which should be about seventy-five per cent of last year's shipments. We have, however, done better than that. In the San Joaquin Valley all tree fruits excepting apricots were full crops, as were also grapes.

CHERRIES.

The first car load of cherries for the season was shipped May 8th, and was forwarded by freight. The first car for 1908 was shipped May 25th, which was unusually late, the records showing first car lot shipment in previous years as follows: 1902, May 13th; 1903, May 9th; 1904, May 13th; 1905, April 22d; 1906, May 2d; 1907, May 5th. All these first shipments went forward from Vacaville.

A total of 249¾ cars of cherries were shipped, this being 41½ cars more than in the preceding year. As has been stated before, this did not result from a larger crop than in 1908, but the canners and other factors, which are usually purchasers of this fruit, were not much in evidence, the Eastern market was good, and the result was the increased shipment. Prices were very satisfactory. Practically all these shipments were forwarded by the regular freight service, which proved perfectly satisfactory, and was infinitely cheaper than express.

APRICOTS.

Apricots were almost a total failure in the early sections, but were better in Santa Clara, and a fine crop south of Tehachapi. There were, however, nearly as many cars shipped as in 1908, when the crop was the heaviest known for several years, the shipments for that year being 231¾ cars, while that of 1909 was 208¼ cars. Prices were very satisfactory.

PLUMS.

The plum crop, while very good, was not heavy. Trees of this variety showed wonderful qualities of endurance and productiveness, some trees which were so loaded with fruit the preceding year that the

product was too small for shipment, and whose buds were inferior and poorly developed, surprised the most experienced observers with a good crop. Our plum shipment reached a total of 1,526¾ cars, or only 237 cars less than in 1908. Prices were unusually good. Our plums seem to be increasing in popularity everywhere, and are a very desirable fruit. Many of the so-called Burbank varieties resemble the Bartlett pear in having the exceedingly valuable property of ripening up beautifully and developing an exquisite flavor when picked green. This is true particularly of the Climax and Wickson.

PEACHES.

The peach shipments were quite heavy for California, a total of 2,599 cars going forward, or 620 more than last season. The quality of the fruit was not very good, much of it being small and inferior, and in some localities was very wormy. Owing to the shortage of this variety in Eastern fruit growing centers a strong demand was anticipated, thus undoubtedly causing the shipment of a quality that should never have been permitted to leave California in its fresh state. Prices were low on the major portion of the shipments, and returns to growers were very small. To add to the misfortune, there was a car famine that came at the height of the season, some of the fruit lying on the loading platforms and in the packing houses from twenty-four to seventy-two hours, thus causing it to arrive at destination in a soft and overripe condition.

PEARS.

The Bartlett pear crop was very good, and the quality of the fruit was unusually fine, being of good size, and free from scab and other defects. Winter pears were generally a short crop. Shipments were 2,638 cars, being exceeded by those of the preceding year by 63 car loads. Prices were generally very good, owing to the fact that the crop was almost entirely sold at a time when the Eastern markets were nearly bare of domestic fruit of all kinds, and especially of this variety. The reason for the heavy Eastern shipment of pears is to be found in the absence of demand on the coast, the canners who are usually heavy buyers being practically out of the market until the bulk of the crop had been moved. This variety is undoubtedly the most popular of all California fruit, and for eastern shipment we may well call it "The King of Fruits."

GRAPES.

The grape shipment in 1909 exceeded that of any previous season by more than two thousand car loads, the total for the season being 5,875 cars, while that of last year was 3,812 cars, a gain of over fifty per cent in one year, and it is probably true that there were more than 1,000 additional car loads available had the demand and condition of the fruit justified shipment.

The grape market was satisfactory until about September 15th, covering the sale of upwards of 1,200 car loads, but after that time prices were low, and in the great majority of cases showed no profit to the grower. A reason for the low prices is to be found in the fact that not only was the shipment from this State very much heavier than ever before, but unfortunately it came into direct competition with a very

heavy crop of grapes and peaches grown in the East. A conservative estimate made in our office early in August indicated an output of upwards of twenty thousand car loads of peaches and grapes alone from Michigan, New York, and Ohio, this fruit nearly all crowding into the market between September 1st and October 15th. As there were also great quantities of apples, pears, plums, etc., coming in at the same time, making an enormous aggregate of probably more than one thousand car loads per day, it is not to be wondered at that California growers, handicapped by the high cost of labor and transportation, have no profit to show for these late shipments.

APPLES.

Apples are not handled by this organization, so that no report on this crop, which was fine and profitable, will be made here.

SERVICE.

The refrigerator-car service maintained by the Southern Pacific Railroad Company has proven very satisfactory. The management is in able and experienced hands, and we have found hearty coöperation in all endeavors for the benefit of the service. The only blot on the otherwise splendid record of the Refrigerator Car Company was the car shortage, which came in the height of the season. While disposed to criticise severely at the time, and criticism was certainly due some one, for adequate provision was not made even for the estimated shipment, still we must admit that most of the trouble was caused by the exceptionally large offerings, and we must give credit, too, for untiring exertions on the part of the company to remedy these conditions as soon as they realized the necessity for so doing.

RAILWAY SERVICE.

Local railway service from shipping point to Roseville, where through trains for the East are made up, was very unsatisfactory, owing to a number of causes unimportant in themselves and which we hope will be overcome another season. From Roseville to the East service has been almost uniformly good, although we contend that the running time between here and the East should be cut down from 160 hours, present schedule, to 147 hours, thus enabling fruit to be sold on the seventh morning in Chicago. A very slight increase in the speed of trains would make this gain possible, and it is one of the many betterments that the California Fruit Distributors are making a strenuous fight to obtain. The Santa Fe Railroad proved a good friend to the fruit men this year, not only loaning to the Southern Pacific Company all the refrigerator cars that could be spared from their own business, but putting into the Sacramento River service their fine steamer, making it possible for the Southern Pacific Company to handle expeditiously the exceedingly heavy pear and plum business of the river section during the month of July.

A very considerable amount of fruit was shipped East over the Santa Fe lines during the season, and the service was the best ever received for California fruit, their running time from Fresno to Chicago being

151 hours, which schedule was almost entirely maintained during the season.

RATES.

The question of rates is a most important one, and the distributors have labored constantly to help the growers of California secure such concessions as would put the industry on a safe and paying basis. At the last Fruit Growers' Convention a transportation committee was appointed to consider this matter, and I want to heartily commend the splendid work it has done. The committee has been untiring in its efforts, and has collected an array of statistics which are a revelation.

We had hoped to be an effective agent in aiding the growers obtain the desired relief, and to that end we sent a representative from California to attend the recent meeting of the Transcontinental Traffic Association at Chicago to urge upon the representatives of the transportation lines at that meeting the absolute necessity of granting us the so-called "postage-stamp" rate of $1.15 per 100 to all points in the East. Owing to unexpected opposition in some quarters, we were unable to obtain what we asked for, although we must give credit to the Southern Pacific and the Santa Fe representatives for what we believe to be a sincere wish to secure for us the desired rate. A considerable concession, however, was obtained, as can be seen by comparing the old rate with the new one that has been promised:

New York, Boston, Philadelphia, Baltimore, old rate, $1.45; new rate, $1.40; and on peaches and grapes, old rate, $1.45; new rate, $1.25.

Buffalo, Pittsburg, Cleveland, old rate, $1.35; new, $1.30; peaches and grapes, old rate, $1.35; new, $1.25.

Detroit, Cincinnati, Indianapolis, old rate, $1.25; new, $1.20; peaches and grapes, old rate, $1.25; new rate, $1.20.

Chicago, St. Louis, Minneapolis, St. Paul, $1.15. No change.

It is a great disappointment that our just demand was not granted, but as the rate asked for is absolutely essential, we will continue our efforts, and that ultimate success will be achieved we do not doubt. Even as it is, however, had the present crop been handled on the reduced rate, a saving of over $200,000 would have been made, which sum put into circulation among the growers would have tended to alleviate some of the heartaches.

In making a comparison of the shipments of this season and last it is to be seen that the gain of nearly 2,400 car loads was made entirely in peaches (gain 620 cars) and grapes (gain 2,059 cars), other varieties, with the exception of cherries, showing a decrease. Heavy shipments of peaches were made from the San Joaquin Valley, where the crop was fine, more than overcoming the considerable shortage in shipments of this variety from Placer and other sections, and creating the excess of 620 cars. A considerable part of the increased grape shipments came from the Lodi district, where the acreage of table grapes is very extensive, but all parts of the State contributed in proportion. In the Lodi district a larger percentage of the output was handled by shippers outside of the California Fruit Distributors than ever before, and the San Joaquin Valley was an inviting field, not only for these firms, but for several new ones who tried their hands at the game, and it is a significant fact which may or may not be related to this condi-

tion that it was on these two varieties that no money was made by the growers. We fully believe, however, that could all of this business have passed through one channel, results would have been far better. Competitive shipping from California is the Eastern dealer's opportunity, we can not blame him for buying at as low a price as possible, but as our bread and butter depend upon securing a reasonable price for our products, we certainly are very shortsighted if we do not make every effort to protect our interests. It is quite customary for dealers to wire us that so-and-so is quoting fruit for a less price than we are asking, and we have do doubt that he is saying the same thing about us to our competitors, and we are told that it often happens that he makes his bluff work, and succeeds in buying at a lower price than was established, when in all probability the original price was fixed as low as it could be and show a living profit to the owner. If all fruit was sold through one channel such things as this could not be done, and the further we get away from this idea, the nearer we get to calamity. With the limited output of the past this danger was not threatening, but with the wonderful increase of the past few years every thinking and conservative grower must recognize the fact that we are drifting towards the rocks, from which nothing can save us except united and harmonious effort.

Much misconception of the object and aims of the California Fruit Distributors exists in the public mind, and there are some growers who have been taught to believe that the organization is a trust, formed for illegal and ulterior purposes, but the truth of the matter is that no enterprise ever undertaken in the fruit business has done so much to advance the interests of the whole industry as this. We have long since passed that stage of our business when our fruit could be sold to good advantage anywhere—now we must give the most careful consideration to each market, study its peculiarities and requirements, and then give to it only so much, and of such kinds as it can handle at paying prices. This is what the California Fruit Distributors are trying to do; what they are doing, so far as it can be done by any organization which does not handle the entire output. With a considerable volume of business passing through other channels, the destination of which is unknown to us, we are necessarily handicapped in our efforts for perfect distribution and maintaining of prices, unavoidably resulting in an occasional glut of auction markets and a lower range of f. o. b. values, all of which is productive of loss. It is not necessary to ask upon whose shoulders must fall, not only the direct loss so occasioned, but worse still, the depreciation of land values, which always is sure to follow when our business is no longer profitable. "United we stand, and divided we fall," is just as true of the fruit business as of our national government, and is a lesson that fruit growers must learn before our industry can be placed upon the high plane of commercial success. (Applause.)

PRESIDENT JEFFREY. The next address will be, "A Grower's Marketing Agency," by W. C. Walker, manager of the California Fruit Exchange, Sacramento. (Applause.)

A GROWER'S MARKETING AGENCY.

By W. C. Walker, of Sacramento.

The old truism, "Necessity is the mother of invention," can very appropriately be used as the text for a discourse on the question of a grower's marketing agency. It has been well said that history often repeats itself, and I hope in this paper to offer food for thought and the discussion of a similar problem, if not the identical problem that confronted the growers assembled at the State Fruit Growers' Convention held in San Francisco, December 5, 1909. At that meeting the growers of tree fruits grown for Eastern shipment were in a dilemma, and as a result of a general admission all round that the situation was indeed serious, a resolution was adopted as follows:

Whereas, It is a fact that unless measures are devised to relieve the present situation, the greater portion of our shipping fruits will have to be worked over into drying or canning varieties, thus relieving us of one great outlet for the products of our orchards.

At that time drying and canning fruits, also table grapes, were in excellent demand and the only real dark outlook was in shipping fruit. We have lived to see all three fruits mentioned reach a marketing stage more serious than shipping tree fruits. We have had the pleasure of seeing the organization which was created as a result of the resolution, develop a market not only for the crops then in peril, but ship canning varieties East successfully the past season—a dried fruit agency formed and patterned along the same lines successfully marketing raisins and dried fruits, and we hope to develop a way for making our table grapes more profitable.

A committee was appointed to prepare a form of organization. The committee met in Sacramento, January 16, 1901. The name adopted was the California Fresh Fruit Association.

A later meeting was called at Newcastle, where the committee made its report, and as a result associations were formed at Loomis, Newcastle, and Penryn. The associations were formed for the purpose of gathering the fruit and loading it into cars for market; each realized that individually they would be almost powerless in the markets against the many rival concerns then engaged in open warfare, and a competition which if continued would have meant ruin to many growers as well as those engaged in the shipping business. Therefore, a marketing agency or exchange was needed for obtaining orders, distributing, and selling the fruit. The result was on May 1, 1901, the California Fresh Fruit Exchange was incorporated as a marketing agency for the various growers' associations. It had no jurisdiction in local affairs, but had merely to do with finding markets. This arrangement was wise and needful, for should the control be from the central organization, the exchange would become all powerful, and the master instead of the servant. It has worked out that the associations to-day are all powerful, and the exchange purely a marketing service with the ownership and control so widely distributed over northern California that any danger of a few getting hold of the government of the organization is averted, because the same is vested in representatives from districts several hundred miles apart. The directorate is made up from the various associations, and they are all so anxious to maintain it as a purely

marketing agency that our sphere in life has been well defined and established.

The working of the exchange resolves itself as follows: The local associations gather the fruit of their own locality, supervise to some extent the packing, the distribution of shooks, the loading of cars, etc. These associations turn over to the exchange the loaded car. The bill of lading and papers are forwarded to the Sacramento office; the exchange finds a market for the product, collects for the same, and returns to the local associations the checks for the growers, and the local associations in turn pay their members. The operation is quite simple, and from experience it has been found that it is advisable to follow the above procedure.

It would seem that returning to the grower all his fruit would bring, the distribution of market information, etc., the exchange would have nothing but a smooth road to travel on, but obstacles were encountered, and some of them seemed almost insurmountable. The first was in regard to the matter of obtaining box shook, packing houses, pay for the help during the season when no shipping was being done, loaning of money to growers during the winter, etc. It was also discovered the growers organized in Placer County to market their own fruit did not have a complete list of assortments, and found from experience that in going before the trade of the country it would be necessary to have a complete assortment to successfully trade in the big markets. Therefore, it was necessary to reach out and do missionary work and teach growers to organize. All of this required money. How was it to be secured? The banks did not care to loan to the associations because they had no capital stock, and it was necessary for the association directors to put their personal signatures upon the notes to raise sufficient funds to do business. These amounts, as far as the local associations were concerned, did not total very much, but in the exchange the aggregate was considerable; in fact, so high that a good many of the larger growers would not serve as directors and take the risk connected with the loss when they had nothing to gain beyond the marketing of their fruit.

The above was the most serious obstacle ever presented. How could the growers finance such a big undertaking without any capital to start with? In other words, attempt to build something out of nothing. The outcome was the present organization known as the California Fruit Exchange, a coöperative stock corporation. The by-laws are so arranged that no one individual, partnership, association or corporation can own more than ten shares of stock, thereby eliminating the danger of control by a few persons, and at the same time overcoming the objection of the banks. On February 19, 1907, the old exchange was reorganized, and is now known as the California Fruit Exchange. Stock was subscribed for and promptly paid up, as a great many growers willingly purchased a share of capital stock then valued at one hundred dollars ($100). The local associations each purchased a share of capital stock thereby making the connecting link between the associations and the exchange. The results have been very gratifying, the banks have learned that the exchange is thoroughly sound financially, that it does not buy or speculate, thereby insuring a solidity; and the corporate notes have been accepted without requiring a few persons to take the big risk that formerly attended the financing.

In selecting the directors, it has always been the aim to pick one from each shipping association first and then make up the balance of the directorate from some of the old "stand-bys."

The annual balance sheet to December 31, 1908, showed an organization with a splendid surplus, and a record of having paid two dividends, and every prospect of a continuance of the same.

The dividends are disbursed as follows: first 6 per cent is set aside as a payment on stock, then 20 per cent of the net earnings for the first three years is set aside as a reserve fund. The balance is divided 75 per cent among all growers, or growers' associations, who have signed contracts and shipped consistently, in proportion to their gross earnings, and 25 per cent as a further dividend on stock. The first and second years we divided the balance half on stock and half on gross sales, but we recognized as a grower's organization the stock was earning too much, and changed it to increase the dividend on the tonnage as the stock was only intended as a means to an end and we desired the growers who produce the increment to obtain the benefit of it.

Our growth in tonnage during 1908 (the first year after reorganizing) was about 95 per cent (588 in 1907; 1,146 in 1908). The increase for the State during the same period was about 70 per cent (7,491 in 1907; 12,917 in 1908).

Our gain this year over last has been about 25 per cent (1,146 in 1908; 1,433 in 1909).

The State growth to the same date has been about 17 per cent (12,917 in 1908; 15,172 in 1909).

The growers' organizations with whom we have marketing arrangements are:

Acampo Fruit Growers' Association.
Acampo Christian Colony, through J. P. Dargitz.
Auburn Fruit Growers' Association.
Courtland Fruit Growers' Company.
Florin Fruit Growers' Association.
Fresno Fruit Growers' Company.
Linden Fruit Growers' Association.
Loomis Fruit Growers' Association.
Lodi Packing Company.
Newcastle Fruit Growers' Association.
Penryn Fruit Growers' Association.
Sacramento River Association.
Vacaville Fruit Growers' Association.
Winters Fruit Growers' Association.

We also have a marketing arrangement with The San Joaquin County Table Grape Growers' Association for members who desire to ship through us.

We also have agencies at Lodi and Vacaville. We expect both districts to become association points before long. Our agencies are withdrawn as soon as the growers organize for themselves; that is our only reason for an agency. We also market fruit for growers in several districts who operate individually and load their own cars. These associations and agencies represent practically every important shipping center in northern California, except the apple districts.

With the assortments we are able to give, coupled with a trained

force of salesmen and a good knowledge of market conditions gained from several years' experience, we are able to command the best trade in the country. Our record of cars placed in the private-sale markets during the past two years is enviable. This system of catering to and building up the private-sale system has been the means of returning to growers marketing through us good returns in the face of the depressed market conditions of 1908 and 1909.

We shall now take up the matter of distributing the fruits in the markets. This feature embraces a very large field. The present marketing system of the exchange is the outgrowth of several years' experience. The marketing of deciduous fruits necessitates considerable detail, on account of the many varieties and the different districts in which they are grown. It has required careful study to find out the markets that will take certain varieties and the varieties that will stand transportation to the various markets. The country from Chicago east will take varieties of a different nature than the markets west of that city. This is largely on account of home-grown varieties in the East. Likewise, the markets of the north and those of the south take varieties that are unsalable at profitable figures east of the Rockies. In the marketing of California fruit we have to be most careful to avoid home-grown crops, as they are often preferred to the imported article on account of the quantity, ripeness, and low freight rates. We also find local prejudice often interferes in favor of home fruits. The territory east of Chicago is practically all under the auction system, and that north, south and west under the private sale. After very careful consideration, we determined to make two central points—Omaha for private sale and Chicago for auction. This system has proven very satisfactory, especially at the loading points, where the association manager is able to take certain varieties and put them into cars that he is sure will go to auction and other varieties that will meet with good sale in the West.

We aim to assort cars at all time to suit the Western market, and in this way develop distribution. This assorting requires a great amount of detail. We ship a great number of part cars from one district to another to assemble the required assortment. If the car is delayed it requires a careful inspection, so as to keep the fruit that has ripened out of Eastern cars. In filling orders this year we assembled a great many cars at additional expense to ourselves. But the cars thus assorted usually were accepted at satisfactory prices and more than repaid the local freight and other expenses.

We furnish circulars regularly to our agencies, showing the time varieties will be in season. We also issue a circular each year giving a very complete list of the estimated ripening dates and time shipments will begin and end. The agents by following the same are in a position to tell their trade ahead of time just about the varieties to expect and thus be in a position to calculate on future requirements.

The packing is all done at home or in the orchards, with the exception of Fresno, Acampo, and Lodi where some of the fruit is hauled to the shipping houses in lug boxes and there packed. The house managers endeavor to inspect all packs as delivered and reject when below standard. We make a special effort to load all fruit the day it is

received, our aim being to deliver to the railroad company fruit in prime condition. The managers of the shipping houses endeavor to ship nothing but hard, good-keeping stock; fruit that is too ripe is sold locally, as there is usually a good demand. We approve the recent standardizing plan as we know its need. In fact, we have practically been doing the same thing in our own way for several years.

The day following the shipment a telegram, giving full details of each car, is sent to our general Eastern office, which in turn advises the agents promptly. Thus they have full knowledge of all fruit rolling. Time is a great element in the handling of deciduous fruit, owing to its very perishable nature. This calls for prompt action along the line. We know the individual growers, and definite advice from the Eastern markets as to packs gives us an opportunity to reach the grower and correct the fault in future shipments. Detailed reports received collectively point out faults which could not be detected individually. If three or four points complain about a certain grower's pack, we know the fault lies at home and not with the transportation or refrigeration.

Prices are made by the head office in accordance with the supply and demand on all cars except those sold at auction, where prices are determined by the purchasers. We have arrangements with the California Fruit Growers' Exchange to use their salaried agents at all points where they have same, and we select any broker we choose at other points. By conducting our sales direct with our agents we are in very much better touch with the market than by turning over our shipments to any other organization. Our present system keeps us in direct touch with the market without going through too many channels. In this way we are unhampered and our ideas of value are not dictated to or passed upon by any one but ourselves, and it is only natural to suppose, being a grower's organization, we hold out for the highest price obtainable. The prices on deciduous fruit fluctuate rapidly because of the number of States that produce this character of fruit, and by having a free and unhampered selling system, we are able to take full advantage of prevailing conditions. As an answer to our values realized, we have only to point to our successful growth.

We have followed the practice of having only one agent in any one city, believing the practice of dividing up offerings brings one's own fruit into competition with itself, which, to say the least, is detrimental. We make a practice of selling the cars impartially because we do not buy or speculate and the exchange has nothing to gain but the highest confidence of its membership, and in order to do this all must be treated alike. We consider our satisfied membership the best evidence that this has been the case. We have not lost a dollar on bad accounts in the East since 1902. We endeavor to make payment to our growers promptly, our average being about twenty-five days from the date of shipment, and to do this no time can be lost in making remittances.

As a general thing the account sales leave the office the same day the money is received, and a delay of five or six days in sending the check from an Eastern district will cause just about that much delay in returns to the growers.

The exchange charges its growers the usual commission and other

prevailing charges. At the end of the season, after all expenses have been defrayed, whatever is left over is paid back in the form of a dividend, as previously explained.

We consider the advices received during the year to be worth a great deal. Our agents write about the markets, crops, weather, trade, etc., and the same in turn is given our growers, thereby enabling them to keep in close touch with the matters affecting their fruit.

We believe in viewing coöperation broadly and as a strictly business proposition. In fact, this system is putting the deciduous business in California on a strictly industrial basis without any speculative features attached to it. It must be obvious if the growers can not make a success marketing their own product through an agency well equipped and constructed on businesslike lines, there is nothing in the fruit business for the grower. We have found out to our satisfaction that the agency as we now have it is a success, and our growers, as a general thing, are successful. Therefore, we have great faith and confidence in the future of deciduous fruits from this State, and many of our growers, through careful study of prices realized on certain varieties and the time of shipment of other varieties, have grafted over portions of their orchards so as to make them profitable for practically the entire season.

In our annual meetings we have never been afraid to take up policies that we think have been wrong and thrash them out in open discussion. We have endeavored not to be selfish in our ideas, and the very democratic way in which our meetings are handled have in themselves been a great source of strength, because we obtain the combined intelligence of a great number of growers who we consider are the practical fruit men. In fact, our whole system resembles to a great extent that in vogue by this republic. The associations, we might say, represent the individual States and the exchange the Federal Government. The States attend to all their own local affairs, devise their own laws, have their own boards of directors, etc., and they delegate to the exchange or Federal Government the handling of their foreign relations connected with the business away from their own respective locality. The associations in turn send to the board of directors their representative, so that the board in turn becomes the house of representatives, and the widespread interests represented are in themselves a safeguard and a great source of strength to the whole institution. In fact, to say a coöperative concern can not succeed is as illogical as to say this republic is not a success.

We have tried to show the benefits secured the grower by coöperating, and experience has proven the following advantages:

A marketing agency owned by the grower, thus ensuring an avenue to market under the growers' complete control at all times. This in itself means the danger of a monopoly controlled by others than growers on fruit marketing is a thing of the past.

The full market price returned to its members.

The cost of marketing reduced.

The general pack vastly improved through the advice of the Eastern agents, thereby causing our fruit to command a better price.

This exchange is growing daily, and when our advantages are better

known to growers in all districts we expect to have a very large growth and become the controlling factor in deciduous fruits from this State.

We have recited above what we consider the most important features in this deal, and trust they will bring forth a discussion that will be beneficial. (Applause.)

PRESIDENT JEFFREY. The next number, and the last on the program, will have plenty of time. I hope everybody here will put down what points he wants to discuss to-morrow. Mr. Stephens will come forward as the representative of the Committee on Freight Rates, and we will be glad to listen to his report. (Applause.)

MR. STEPHENS. *Mr. President, Ladies and Gentlemen:* I realize very forcibly that I do not possess the ability to present in a forcible and convincing a way as should be done the important matter which I am called upon to do. I doubt if anybody could do it, and I make no attempt at oratory or anything of that kind, but get down to business in my own awkward way.

To commence, I wish to say that for the first time, through conditions existing in the past year and the year previous, the shippers and the growers stand as a unit. There is no division in sentiment, no division in opinion, regarding the questions that are contained in this report. That is a very satisfactory condition to me and to all growers and it should be to all who take an interest in the future upbuilding and prosperity of this State. I wish to say in addition, regarding the work of the committee, that we have not been idle, that we have been attending to our duty for a year, and there was scarcely a week that we have not been engaged in presenting to the railroads arguments in favor of your contention. That has not been done without cost. We have called upon nobody to aid us in this respect. We have gone down into our own pockets to defray the expenses of the committee necessary in order to present your demands—at least, your request—to the transportation companies, the railroad officials, of the necessity of granting the relief which you have asked. That has not been any small sum, either. It will come nearer $350 to $400 than anything less, and yet we have not asked anybody to contribute towards this fund.

Inasmuch as there will be an opportunity to-morrow afternoon for discussing this and other questions that have been presented to you for consideration, it will not devolve on me at this time in any way to enter into such discussion.

REPORT OF THE FRUIT GROWERS' COMMITTEE ON FREIGHT RATES.

By R. D. STEPHENS, Chairman, Sacramento.

Mr. Chairman, Ladies and Gentlemen, Fruit Growers of California: Your committee on Freight Rates begs leave to make the following report and asks that you give to the questions therein discussed the consideration their importance demands:

In presenting the report, I wish to say in behalf of the other members of the committee, that they were ever ready and willing to do their full share of the work. They were anxious to do all things honorable that were in their power to win for you that which is justly due you. They believe that deciduous fruit shipments East should, at least, be placed upon an equality with the citrus shipments made from the southern part of the State.

When we entered upon the discharge of our duties, we believed that we would have but little difficulty in convincing the railroad officials that your request was

supported by every principle of equity, and therefore just. Just, not alone to you, but also just to the railroads; just to those who, through promotion literature sent out (much of which was misleading and extravagant in its claims of profits made in fruit growing, by the railroads, promotion committees, large landowners and real estate dealers), were induced to sell their homes and holdings in the East and come to California and invest their all in growing fruit for Eastern shipment; just to those who, through honest and honorable effort, are trying to promote and build up the Sacramento and San Joaquin valleys; in fact, just to all legitimate interests.

We believed that the railroad officials did not understand the true condition of our deciduous fruit industry and the imperative demand that relief should and must come to it in order to save a large per cent of its growers from financial ruin. We believed all we would have to do would be to show them facts and figures to convince them that you were asking no more than you were entitled to.

In the discharge of our duties we soon realized that the purpose for which we have been selected was not so easily accomplished as at first it seemed it would be. However, having accepted the positions you so kindly tendered us, we felt that we were in honor bound to do all that our ability would permit us to do, to gain for you the relief necessary to place your interests upon a small paying basis. In the discharge of our duties we have spared neither labor nor expense. We have acted strictly from a conscientious standpoint.

In presenting your claims we have not indulged in the use of abusive language nor language that any gentleman could take exception to, but, on the contrary, have been more supplicative than otherwise. Neither have we dealt in generalities alone but, on the contrary, we have presented eighty-seven different railroad officials with data containing facts and figures in support of your contention, none of which, up to this time, have been proved to be incorrect.

I presume there are some present here from Los Angeles. The next question considered, then, will be of interest to the Los Angeles people, because it relates to the question of taxation—one, in fact, that we all feel interested in. We all feel that we are overtaxed, taxed more than we should be, to defray the expense of government; therefore, to those people of Los Angeles I wish to call attention to the fact that they are paying also heavy taxes, yet not in proportion to the deciduous fruit growers of the San Joaquin and Sacramento valleys.

TAXATION.

You have just gone through the ordeal of paying your first installment of state and county taxes, and no doubt many of you, if not all of you, feel that the rate of taxation for the support of the government is unnecessarily high and oppressive. That such is the feeling of the fruit growers of Placer County is evidenced by the speeches and the action taken by the growers at a meeting held at Loomis on September 19th last, at which Judge N. P. Chipman took a strong stand against the tax levied on fruit trees and vines.

Judge Chipman said, in part, "There is no greater iniquity than that tax. There never has been a more unjustified piece of legislation. Nothing can justify a tax on growing fruit trees, and by concerted action you should be able to accomplish much towards overcoming its evils."

I agree with Judge Chipman. The tax on fruit trees and vines is an evil which should be remedied at the earliest possible moment. There are many trees and vines that bring no profit to their owners; instead, the care and handling of their products brings a loss.

I believe the delegates in this convention should pass a resolution tendering Judge Chipman a vote of thanks for the firm stand he had taken upon this question. The only fault I have to find with Judge Chipman is that he does not go far enough on the question of taxation.

The deciduous fruit growers, whose products are shipped East to find a market, stand in a class by themselves as taxpayers, when the question of indirect as well as direct taxation is considered.

There is another tax—you may call it by whatever other name you please, and it will still remain a tax in character and in fact—which the fruit growers have to pay, that is far more oppressive and excessive in its demands than the one mentioned by Judge Chipman. This tax is levied by a self-constituted authority, which arrogates to itself the right to levy tribute, without consulting with or asking the consent of those who have to bear its burden, and there seems to be no influence or power sufficiently potent to restrict it in its demands. This tax, for it is nothing more nor less than such, is assessed against the deciduous fruit growers' products in the way of charges for transportation on their Eastern shipments.

I doubt if any one here ever gave this question serious consideration or realized the magnitude of this tax, which is being imposed upon the fruit growers of California, and which is particularly oppressive to the deciduous growers of the Sacramento and San Joaquin valleys.

In order to illustrate how this tax affects the deciduous fruit growers when

compared with the state and county tax, I will call your attention to the following statements taken from the records; therefore, correct:

GROWER NUMBER ONE.

Charges for transportation on 53 cars	$22,648 00
State and county taxes	1,031 00
Excess transportation tax	$21,617 00

This grower pays $21,617.00 more tax for transportation than he pays for state and county purposes, or over 2,098 per cent more. His state and county tax amounts to over $19.00 per car.

GROWER NUMBER TWO.

Charges for transportation on 36 cars	$15,380 00
State and county taxes	503 00
Excess transportation tax	$14,877 00

This grower pays $14,877 more tax for transportation than he pays for state and county purposes, or over 3,057 per cent more. His state and county tax amounts to $14 per car.

GROWER NUMBER THREE.

Charges for transportation on 66 cars	$28,246 00
State and county tax	787 00
Excess transportation tax	$27,459 00

This grower pays $27,459 more tax for transportation than he pays for state and county purposes, or over 3,589 per cent more. His state and county tax amounts to about $12 per car.

These are fair illustrations and show how the fruit growers are being taxed and that so heavily that it will not be long, unless relief in some form comes to them, until their orchards and vineyards pass into the control of their creditors.

The question that you are now called to pass upon, which is of more importance to you than all other questions combined that have bearing upon your interests, is, are you going to make an effort to protect yourselves from financial ruin? Should you decide in the affirmative, then the next question will be how? It is quite plain that you can not afford to remain inactive any longer. You can not expect assistance from others, unless you manifest a disposition to help yourselves. Now, what are you going to do?

Now, Mr. Chairman, I am afflicted with a cold and I would like to have the secretary read a portion of the report any way, if no more. This is a copy of what is termed and known in the report as the "Printed Petition." You understand, ladies and gentlemen, that we made a request. We had to back that request up in some way in order to be justified in making it, and therefore we presented it to these eighty-seven different railroad officials, facts and figures regarding the cost of production and setting forth the reasons why the deciduous fruit interests demanded it. We have here statistics compiled from all the auction districts in the United States, showing the result of the sale of 1,046 cars. It shows heavy loss to the growers. These sales were made in 1908. In this you will also find what I stated in the preliminary remarks, that we are backed by all the shipping interests. Here are communications from the Earl Fruit Company, the Producers' Fruit Company, the California Fruit Exchange. Also, we have a letter from Mr. F. B. McKevitt, manager of the California Fruit Distributors, in the matter that we submitted to the railroads for consideration, representing all the other shipping interests in that organization. This is the report which I would like to have read, or such part of it as will give you an idea of the work done by our committee. And while I think of it, I wish to call your attention to the fact that the date in this report

regarding the statement of the printed petition is wrong, and if you will be so kind as to change that date on all the copies you get and make it read "January 30, 1909," instead of "January 30, 1908," because we filed this petition of the growers and shippers combined with the railroads on the 30th day of January, 1909, and in putting it into type they made a mistake. There is another thing I wish to call your attention to. In the index you see among the subjects referred to, "Dealing with Facts, not Theories." It is given here as page 26; it should be 27.

This is a very elaborate report and I wish to call your attention to a statement made in the report of the cost to the grower. These have all been presented to the railroads and we have challenged investigation. We requested that we be permitted to have a conference with the railroad officials, that we might be given an opportunity to discuss the pros and cons. We have not been able to get anything out of the railroads in the way of an expression since the filing of our petition, with the exception of two letters which we will now proceed to read.

SACRAMENTO, Cal., February 13, 1909.

Mr. H. A. Jones, Frt. Traffic Mgr. S. P. Co., San Francisco, Cal.

DEAR SIR: Your letter of the 6th inst., in reply to ours of the 4th, which was accompanied by petition from deciduous fruit growers and shippers north of the Tehachapi, received.

In this reply you say: "I assure you that I will be pleased to hear from you at any time on the subject that interests the growers and want you to understand that we are inclined to do anything reasonable to further your interests so far as we can consistently do so."

You also say: "It goes without saying that our interests are mutual and that this company will not place any impediment in the way of developing and increasing the deciduous fruit business, but you must not forget that we are not free agents in establishing rates over territory beyond our own lines."

We are pleased with these statements, for we believe they were made in all sincerity. These assurances give us faith that we will get the reduction in the freight rate asked for in our petition.

We also believe that when we give you additional facts, facts that can not be successfully disputed from any standpoint, you will realize the absolute necessity of your coöperation with the growers and shippers, in every way possible, in their efforts to broaden the area of distribution, and thus increase consumption to a degree that will keep pace with the rapidly increasing production.

We wholly agree with you when you say: "It goes without saying that our interests are mutual," and we wish to impress upon your mind and upon the minds of all other railroad officials that have any interests in deciduous fruit shipments from California that anything we say in advocacy of the granting of the prayer of our petition is said in the true spirit of friendly feeling, void of any prejudices of any nature or kind whatever.

You say, in substance, that the greater portion of the orange shipments are made without refrigeration, which, when reduced to its lowest denominator, means that the railroads lose the profits made on shipments under refrigeration. In other words, shipments made without refrigeration do not bring so much profit to the roads as do the shipments under refrigeration.

Therefore, it follows that the railroads receive more profit from deciduous shipments than they do from orange shipments made without refrigeration.

Again, you carry orange shipments from south of Tehachapi to New York over your road, which is practically one sixth longer haul than is the deciduous haul, at a freight rate that costs the growers $72 less per car than it costs the deciduous growers per car for shipments made from the Sacramento Valley to the same destination.

In order to show how heavily handicapped the deciduous growers are, to the $72 above mentioned must be added $97.50 for refrigeration on their shipments to New York from all stations outside of Sacramento City and Placer County, in the Sacramento Valley.

This makes a total additional cost to the deciduous growers of $169.50 per car, which is practically 50 per cent higher rate than it costs for orange shipments.

If the same rate per mile were charged the orange growers south of the Tehachapi to Chicago, which is practically a 20 per cent longer haul, it would cost the orange growers about $55 per car more for freight, to which add $85 per car refrigeration charges on deciduous shipments from all points outside Sacramento City and Placer

County, in the Sacramento Valley. This makes it $140 more per car than it costs the orange growers, or something over 50 per cent additional cost per car on deciduous shipments.

You are requested to give careful consideration to the following items of cost per car for deciduous fruit shipments, including freight and refrigeration charges, from all stations on the Sacramento and Placerville railroad to New York.

(Same rates prevail from all points in the Sacramento Valley except on shipments made from the City of Sacramento and Placer County. The number of cars loaded at Sacramento is small when compared with the cars that bear the heavier rate for refrigeration.)

Freight		$348 00
Refrigeration		97 50
Railroad charges		$445 50
Loading	$18 50	
Average cost of delivery at car	18 50	
Cost of crates, complete	124 63	
Cost picking, packing and hauling to packing house	158 52	
Cost of production	144 72	
		464 87
		$910 37
Commission on $910.37 at 7 per cent		63 75
Commission on commission $63.75		4 46
		$978 58

The items of the cost of picking, packing, etc., and the cost of production are taken from the writer's own expense account of such cost and are absolutely correct and are subject to your inspection and investigation. These charges do not include the family cost of living, nor interest upon the capital invested, which every organized business interest, including railroad companies, claim to be a legitimate charge, and railroad companies arrange their passenger and freight rates so they will at least bring them sufficient revenue with which to pay all expenses and interest at a rate that will give then a reasonable profit upon their capital invested.

As stated, the cost for support of the family and the payment of a reasonable per cent of profit on the capital invested are not included in the cost above given of growing and marketing a car load of deciduous fruit.

The boom literature that has been sent broadcast all over the civilized world by California promotion committees, chambers of commerce, syndicates and associations formed for colonization purposes, claiming that five and ten-acre tracts, when planted to orchard and vineyard, will bring to their possessors an income sufficient to comfortably support a family and leave something to lay aside for a rainy day and old age, has resulted in inducing many to come to California and to go into the deciduous fruit growing business upon both small and large scales.

It is a small family that has less than three members, and if less, then one that is not much good for the upbuilding of the State, and particularly not much good to bring in revenue to railroads. In order to illustrate the point, we will assume that there are only three members of the family, and that it will take one dollar each per day, or $1,095 per annum to support them, an allowance we believe you will not think an extravagant one, and such as we do not believe you would be willing, under existing circumstances, to assume the responsibility of carrying out—out of which the cost of feeding, clothing, educating, paying doctor's bills, railroad fares, and other necessary expenditures must come.

In considering this matter we will eliminate the five-acre tract altogether, for the reason that the sense in which the proposition makes it, under present conditions, too absurd to be given a moment's consideration, and take up the ten-acre proposition.

Ten acres will yield, approximately, three car loads of shipping fruit. Divide $1,095 by three and we have $365, which must be added to the $978.56, as shown above to be the cost of growing and marketing in the East a car load of deciduous fruit, exclusive of the cost of family support, and we have $1,343.56, to which we must add the full commission on the $365, which is $27.29, and we find the average cost of growing and marketing a car load of California deciduous fruit in New York to be, without allowing interest on the capital invested, $1,370.85.

Good orchard and vineyard land, planted to trees and vines, has commanded all the way from $300 to $1,000 per acre, and a large area has been sold at these prices.

Take the minimum price on ten acres, and the initial cost is $3,000. The interest at 8 per cent per annum on $3,000 is $240. This sum, together with the additional commission, added to the $1,370.85 above mentioned, makes $1,628.86.

We will not consider the $1,000 acre land. To do so would add $560, together with additional commission, which would make it necessary for a car load to sell for $2,229.81 in order to pay 8 per cent interest on the initial cost or capital invested.

No doubt when you first go over the statements and figures above given you will

entertain doubts as to their correctness; should such be the case, we most respectfully solicit that you make a thorough and critical investigation for the purpose of showing us wherein we have erred. We believe if you will do this you will find that, in a general sense, our statements are correct.

Of course, in some cases the cost of growing and marketing a car load may be less, but where there is one such case, there are likely to be two that will cost more.

Last season, from which our expense figures were compiled, was probably the most favorable for doing such work at a minimum cost that we ever had. Seasons in which we have rain early in September, and two or three more rains before the close of the season, the cost of putting up a pack is much more expensive than is shown to be by the figures given.

In such seasons in the past the same work has cost $291 per car, or $133 more than our figures show. This is a statement of cold, unexaggerated facts, and of a nature to demand your most serious consideration.

Money paid out for permanent improvements is not included in the figures above given.

We believe that if your company will present to its connecting lines, in a manner its power and influence will permit it to do, it will have but little trouble in convincing them that the request of the deciduous growers and shippers is a just one.

We have the utmost confidence in the ability of your company and its management to bring about an adjustment of rates that will give a fair and just distribution between all interests in common of the profits made on deciduous fruit shipments from the Sacramento and San Joaquin valleys.

Hoping for the best, we are

Respectfully yours,

R. D. STEPHENS, Chairman,
M. E. ANGIER,
C. M. HARTLEY,
Fruit Growers' Committee.

SACRAMENTO, CAL., November 9, 1909.

Mr. H. A. Jones, Freight Traffic Mgr. S. P. Co., San Francisco, Cal.

DEAR SIR: We submit to you and ask that you give careful consideration to the following statement, which is made up from the California Fruit Distributors' reports of the sale of California deciduous fruit—mostly table grapes—in the following markets.

This statement includes the gross sale of all cars reported by the distributors and should be accepted as authentic and correct. The sales were made in the following markets:

New York, Chicago, Boston, Philadelphia, Pittsburg, Minneapolis, Indianapolis, Baltimore, St. Paul, St. Louis, Cincinnati, Cleveland, and Buffalo.

September 23d	40	cars grossed	$32,489,	averaged	$812 00
September 24th	43	cars grossed	32,283,	averaged	774 00
September 27th	76	cars grossed	62,536,	averaged	849 00
September 28th	34	cars grossed	29,382,	averaged	864 00
September 29th	58	cars grossed	48,050,	averaged	824 00
September 30th	35	cars grossed	28,229,	averaged	806 00
October 1st	31	cars grossed	27,064,	averaged	873 00
October 4th	62	cars grossed	55,142,	averaged	889 00
	379		$315,175		$831 59

Total cars, 379: average loss per car to grower, $168.41 ..... $63,827 00

Revenue to railroads from 379 cars $163,000 00

During the time the 379 cars above mentioned were shipped there were 713 other cars shipped, making a total of 1,092 cars in eight days.

It is reasonable to assume that the ratio of profit and loss made on the shipment and sale of the 379 cars above given would give a very close estimate of the result of the shipment and sale of the 713 other cars and when applied will show the following results:

Revenue to railroads:

1,092 cars—26,208,000 lbs. $469,000 00

Loss to growers:

1,092 cars—average loss per car to growers, $168.41 ..... $183,000 00

In other words, $183,000 of the growers' principal, the capital they have invested, to produce the 1,092 cars of fruit, was absorbed in making up the $469,000 income to the railroads, and all in eight days.

The demand for labor during the busy season was far greater than the supply, with the result that wages were materially advanced and ranged from $1.70 to $2.25 per day. This increases the cost of picking, packing, etc.

Cost per car to the grower at the $1.45 rate:

Freight and refrigeration	$445 50
Crates complete	110 00
Picking, packing, etc.	231 00
Loading	18 50
Delivery at car	18 50
Interest upon capital invested	90 00
Taxes (minimum)	10 00
	$923 50
Commission	64 64
	$988 14

To the $988 must be added the cost of production, which, when properly done, includes the following items:

Pruning, clearing away brush, twine and tying (when staked), plowing twice, cultivating from four to six times, hoeing, sulphur and applying same twice, irrigating, etc., which, when done in the most economical way, will make the total cost to the grower per car considerably more than $1,000, which does not include family support.

Of the 1,092 cars above given, only 39 of them sold at and above cost, thus showing that eighty-nine and seven-tenths per cent sold at a loss to the growers.

We repeat that no unreasonable, selfish or unjust motive actuates the growers in this matter, but, on the contrary, they are moved by a desire to promote all interests involved.

Many growers—as shown herein, 89 per cent of them—realize that they are facing financial ruin unless relief in some form comes to their interests, which will be impossible, except through a radical change in the present methods and cost of transportation.

The results from shipments and sales of California deciduous fruit this season show that if the request of the deciduous growers to have their shipments placed upon an equality with the orange growers be granted, the question will then be: Will the relief coming therefrom be sufficient to place the rapidly increasing shipments upon a fairly just paying basis?

Any action on the part of the railroads that in any manner will tend to increase the cost to the growers to market their products will certainly bring ruin to a very large per cent of the growers, such as is shown to be the case in the eight days' shipments and rates above given, when more than 89 cars out of every 100 brought a heavy loss to the growers.

The increase to date in deciduous fruit shipments over those made in 1907 is 7,148 cars, or practically 100 per cent.

The increase in table-grape shipments to date over the shipments of 1908 is 1,747 cars, or over 47 per cent.

In conclusion we will repeat what we said in our petition under date of January 30, 1909:

"We call your attention to the indisputable fact, which is, that to broaden the Eastern markets sufficiently to consume at a profit to the growers the great increase in the tonnage of table grapes and deciduous tree fruit shipments from California is utterly beyond the power of the growers, and if this question is to be successfully solved it must be through the ability, allied with an earnest and determined effort on the part of the transportation companies that handle such shipments."

Respectfully submitted.

R. D. STEPHENS, Chairman,
M. E. ANGIER,
C. M. HARTLEY,
Fruit Growers' Committee.

MR. STEPHENS. Now, that was a general average. These were not selected cars, but every car that was reported, some of which brought good, remunerative prices. For instance, the sale of September 28th; there is one car brought $1,271.00, one $1,045.00, and 32 cars average loss to grower, $145.19, made the loss to the grower $4,934.00; two cars brought a profit of $216.00, which is to be taken from the loss, which leaves a net loss of $4,618.00 that those cars sold upon that day. Here are several $1,200.00 cars, $1,100.00 cars; here is a $1,300.00 car on

October 1st; one car brought $1,233.00; two cars $1,144.00; three cars $1,058, and 24 cars average loss to grower $206.38, making a total loss of $3,936.00. The whole list is gone through in that manner.

I wish to state in addition that the Sacramento Valley Development Association, those men referred to as legitimate actors—that is, honorable in their actions to build up the Sacramento Valley—gave an unqualified endorsement to our committee, in as strong terms as an endorsement can be made, because they saw and they see now that some relief in some manner must come to this, the greatest of all interests in the State of California, to the producers, or else you can not build up this State, and particularly the Sacramento and San Joaquin valleys, upon a permanent and solid basis. Now, Mr. Chairman, if you will read the committee's letter addressed to Mr. McKevitt and Mr Walker, you will see how they stand.

SACRAMENTO, November 20, 1909.

Mr. F. B. McKevitt, Gen. Mgr. California Fruit Distributors, Sacramento, Cal.

DEAR SIR: Realizing that in the position you occupy, that of General Manager of the California Fruit Distributors, you have opportunities of gathering information as to the actual results that came from the sales in the Eastern markets of our deciduous fruit shipments during the present season, we, the undersigned members of the Fruit Growers' Committee on Freight Rates, appointed by the fruit growers of the State at their last State Convention, 1908, respectfully submit the following questions, and ask that you give to them your careful consideration, and if after so doing, in your judgment, they have sufficient merit and bearing upon the future development and prosperity of California's greatest and most valuable of all its many resources, viz., its horticultural interests, you will give us the benefit of your knowledge as to the facts involved in the questions, you will greatly oblige the members of our committee.

If we are wrong in any of our contentions, do not hesitate to say so. All we want is the truth. In answering the questions should you see proper to do so, we wish you to take into consideration the fact that there has been 15,006 car loads of deciduous fruit shipped to date this season, against 7,416 in 1907, or, an increase of over 100 per cent in two years.

In 1906 there were 2,050 cars of table grapes shipped against 5,751 cars to date this season, or, an increase of over 180 per cent in three years, with the probabilities of a proportionate increase for several years to come, providing the interest can be placed on a paying basis from a grower's standpoint; otherwise a large percentage of the present acreage must be uprooted.

Do you believe that the request of the deciduous fruit growers of the State, and more particularly those of the Sacramento and San Joaquin valleys, which was made and presented to our initial railroads on the 30th day of January last, to have their shipments to Eastern markets given the same transportation rates as were then being given to the orange growers from south of the Tehachapi on their shipments to the same destination, to be just and equitable to all legitimate interests involved?

Do you believe from the experience and the results obtained from the sales of our fruit in Eastern markets, taking into consideration the great increase made in shipments that the relief prayed for by the deciduous growers would, if granted, be sufficient in itself to place the deciduous fruit industry as a whole upon a sound, dependable and reasonable paying basis?

Has the demand for our fruit in the East kept pace with the rapidly increasing supply?

Has there been an increase in wages for orchard and vineyard labor, and is there a sufficient supply of a class to properly and economically handle our crops?

Is it true that a large per cent of the table grape crop is left on the vines for the reason that it would entail a loss to pick, pack and ship to market without taking into consideration the cost of production, taxes and interest on the capital invested?

From your experience as a grower what has been the cost, since the rain, to properly pick and pack a crate of Tokays?

Respectfully yours,

R. D. STEPHENS, Chairman.
M. E. ANGIER,
C. M. HARTLEY,
Fruit Growers' Committee.

OFFICE

CALIFORNIA FRUIT DISTRIBUTORS

1012 Second Street.

SACRAMENTO, CAL., November 22, 1909.

Messrs. R. D. Stephens, E. M. Angier, C. M. Hartley, Fruit Growers' Committee.

GENTLEMEN: I am in receipt of a communication from you under date of the 20th, in which you ask me as Manager of the California Fruit Distributors, which organization handles about 80 per cent of the deciduous fruit shipments of the State, to answer certain questions in regard to actual results obtained from fruit shipments to Eastern markets during the present season, and other questions relating to the general condition of the business.

In the first place you refer to the large increase in the shipment of table grapes during the present season over those of any preceding year, amounting to over 180 per cent in three years, with the probability that there will be a proportionate increase for several years to come, providing the business may be placed on a paying basis from the growers' standpoint, and that if it can not a large percentage of the present acreage must be uprooted.

It is a fact that grape shipments have increased very materially of late, this present season showing an increase over last year of nearly 2,000 car loads. If the information I have received is correct, this proportionate increase will be kept up for a number of years, until shipments reach such large figures that I do not believe it will be possible to market them profitably. Acting on this belief I have advised growers who have consulted me on the subject to begin the removal of vines preparatory to growing other crops, and this advice I am following myself in our vineyards at Vacaville.

Unless we are able to give this fruit a far greater distribution than ever has been possible in the past I can not see how it will be possible to profitably market the thousands of car loads that will soon be available. There is but one way in which this could be accomplished, and that would be through very low cost of transportation as well as low cost of labor in California, both of which conditions I see no reason to expect in the near future.

You ask if I believe it would be just and equitable to all legitimate interests if the request of the deciduous fruit growers be granted by the railway lines, which request was that their shipments should receive the same rate for transportation as were given to the orange growers of California.

In answer to this question I would say that there should be no question as to the justice of giving as low a rate on deciduous fruit as on citrus fruit. There is no reason why there should be any question about it.

There is, however, one feature in connection with your request to which I would like to call your attention, and that is, that you do not go far enough. While it would help us materially to have the so-called postage stamp rate of $1.15 per hundred apply on our shipments, it will not give the relief required, it will only help.

I do not believe it will be possible for the deciduous fruits of California to pay a greater rate than one dollar per hundred, and am firmly of belief that in the near future the railway officials will recognize this fact, and will be obliged in self-defense to give us such a rate.

A very large percentage of the deciduous fruit shipments from California during the seasons of 1908 and 1909 will show absolutely no profit to the grower, and it will not be possible for this condition of affairs to continue for any great length of time without producing the greatest hardship and loss to all those engaged in the industry. If no relief can be found it will mean that many of our orchards and vineyards must be abandoned.

You ask if the demand for our fruit in the East has kept pace with the rapidly increasing supply, and I regret to be obliged to say that in my opinion it has not. In order to show a reasonable profit to the California grower it is necessary to sell fruit in Eastern markets at a price that puts it out of the reach of the working classes.

Until we are able to sell our fruit profitably to ourselves at a sufficiently low price to enable this great army of people to purchase our products we can hardly hope to increase the demand very materially.

In answer to your question regarding the increase in wages for labor, and asking if there is a sufficient supply of a good class of labor to properly and economically handle our crops, would say that it is a matter of general knowledge that wages are advancing steadily every year, and that there is not sufficient supply of good labor to handle our crops.

Not only is the price of labor increasing, but the number of hours constituting a day's labor are decreasing, and with higher wages and shortened hours there is a material lessening of the output per man. It is not so many years ago that we figured on a cost of 10 cents per package as covering the labor of picking and packing a crate or box of fruit; it has been necessary of late to modify these figures so that now 15 cents is a low cost for this work, and in many instances it will average

20 cents throughout the season. Since the middle of October I believe it is a fair statement that the labor of picking, cleaning and packing grapes has in most districts been in the neighborhood of 30 cents per crate. This high cost can of course be attributed to the fact that the grapes were affected by early rains which made it necessary to pick and clean them with extra care.

You ask if it is true that a large percentage of the table grape crop was left on the vines this year for the reason that there was no profit to be derived in shipping them.

Unfortunately it is true that such is the case. I am informed that in many vineyards in the Lodi and American River districts a very large percentage of the crop is still remaining on the vines, and I know that this is the case in the Vacaville district in our late vineyards.

I have been told that in all probability there were in the neighborhood of 1,000 car loads of grapes left unpicked because there was no prospective profit in shipping them. I do not know whether this is true or not, but I believe there are several hundred car loads of these grapes which will be allowed to rot on the vines.

Your last question is what has been the cost of properly picking and packing a crate of Tokay grapes since the rain.

I can only answer this question from my own experience, which has been at Vacaville. I found some three weeks ago that it was costing 25 cents per crate to pick and pack the Tokays, and as I did not believe there was any margin for profit in the fruit with this high cost for labor, I ordered picking to cease and it is estimated that we have something like 200 tons of grapes remaining on the vines in the 50-acre vineyard of which I am speaking.

A particularly unfortunate thing about these early rains which damaged our grapes this year is that they did not come early enough and hard enough so that all shipments would have entirely ceased, as so far as we are personally concerned it would have been money in our pocket had we not shipped a single crate of grapes since the first of October.

Trusting that I have fully answered your questions and regretting that I can not give a more encouraging report, I remain,

Yours very truly,

CALIFORNIA FRUIT DISTRIBUTORS,
F. B. McKevitt, Manager.

General Manager W. C. Walker, of the California Fruit Exchange, was asked identically the same questions and the following is his reply:

OFFICE

CALIFORNIA FRUIT EXCHANGE.

SACRAMENTO, CAL., November 23, 1909.

Mr. R. D. Stephens (Chairman), Mr. E. M. Angier, Mr. C. M. Hartley, Fruit Growers' Committee.

GENTLEMEN: Your valued favor of the 20th instant at hand. In reply would say we have read over your various communications and can not see wherein your contentions have been in error—in fact, we have been agreeably surprised at the correctness of your figures and the elaborate detail covering the same.

In regard to your question, as to whether we believe the request to have our shipments given the same transportation rates as those of the orange growers, would say we think this request is very mild in comparison to the existing conditions in the deciduous fruit business as a whole. I think that a demand for a rate of $1.00 per hundred would be more in line with our requirements than any other rate, and I believe that in trying to present our position we should leave other industries out of the question, because the situation has changed so tremendously in the past two years that a comparison of the prices realized for citrus and deciduous fruits is so far apart that to even try to put us on the same basis as the citrus fruit growers would be unjust and would not help us to the extent required.

This season has been one of the worst in the history of the business and from the enormous plantings which took place during the last few years the future is even darker than the present. We know that for certain, in some districts, they are contemplating pulling up every third vine, as the growers who have taken time to compute the facts realize that even a reduction to $1.00 per hundred is not going to save the industry—especially table grapes.

As far as we can see, from a strictly cold-blooded business standpoint, it is better for the railroads to pay heed to your requests and warnings now before it is too late. It is almost a certainty that unless the railroads announce that they intend to make a reduction for next year's business, that some uprooting is surely going to take place; whereas, if their intention to reduce the rate is made known this drastic action will be deferred.

In reply to your inquiry as to whether the demand for our fruit in the East has kept pace with the rapidly increasing supply, we can safely answer "No." There

are a few varieties that have been fortunate in the past two years, but there is no telling when even a large crop of those varieties may oversupply the present market.

In answering this question we wish to lay emphasis upon the fact that the firms engaged in the marketing of fruits have not been idle in the matter of developing markets. I know, as far as this exchange is concerned, we placed fruit in over eighty markets last year as against twenty-six in the previous season; and this year the number of markets gone into will far exceed last season; in fact, we have been selling car loads of fruit in markets we never dreamed of three years ago.

The distribution of deciduous fruits to-day is on a very broad scale, especially west of Chicago, so that the fault can not be charged up to the lack of energy in finding new markets; but the supply has been so tremendous in the past two years, and the rates so high east of Chicago, that we are confronted with two problems that are insurmountable; and as the supply is something that can not be reduced unless almost Spartan measures are adopted we are forced to consider ways and means to overcome the hill that we are confronted with, and the first means to help us will be the reduction of the rates east of Chicago, and give us an opportunity to exploit that very large field.

The way the matter stands now our lowest rates are west of the considered center of population. The present center of population is considered about the southeast portion of Indiana. Therefore, if our rates were put on a reasonable basis so that we could reach the mass of the people with our products at a price that will encourage them to buy we can increase the distribution of our fruit very materially; but if we are going to be kept away from the center of population by a burdensome rate the situation is going to continue to grow worse, and where it will end is a grave question.

In regard to your inquiry as to whether there has been an increase in wages for orchard and vineyard labor, would say that I do not believe there is any one acquainted with the conditions but would answer unqualifiedly "Yes." And as to whether there is a sufficient supply to handle the crops we answer "No." As far as we can see, it was a very fortunate thing this year that there was not sufficient labor to handle the crop in time, especially grapes. If there was, the results would have been disastrous for at least three quarters of the entire grape crop.

In regard to your inquiry as to whether a large percentage of the grape crop was left on the vines, as it would entail a loss to ship the same, would say that your statement is quite true. Very frequently we were called on the 'phone by outlying points and asked whether it was worth while to pick the fruit from the vines, and on many occasions we suggested that the fruit be left where it was because we could not honestly counsel them to harvest the fruit. Many and many times we were reluctant to make this statement because we are a growers' organization, trying to seek a market for the products of our members, and we were placed in a very unenviable position to tell a man there was no place for his product, after he had spent the year in plowing, pruning, sulphuring, etc., in order to get his products ready for market and then to know that his livelihood was being snuffed out because there was no place to ship his product with any certainty of receiving back enough to cover the expenses of transportation, packing, and picking.

The result was there must have been considerable over a thousand cars of grapes left unharvested, not by reason of their condition, but by reason of the situation in the markets.

This condition is something very sad to behold, because we know from seeing the accounts from day to day what it means for a man to pick 100 crates of grapes, spend hours carefully cleaning the bunches, getting everything so it looks attractive for the market, haul the fruit to the car, ship the same to the East, and when the accounts come back ask the grower to dig up for the privilege of sending his fruit forward.

This is no jesting matter. We are dealing right now with the question of the homes and futures of a great many people in this commonwealth, and it is surely up to the railroad authorities to take some action and do it quickly, or they will rue their procrastination. Not alone were the Tokays affected, but the Emperors were more or less affected in this way:

The market, as a general thing, for Emperors, is not very active until the Tokays have been pretty much disposed of. This year the Tokay crop held on so long by reason of the big supply and low market that a great number of Emperors were left unpicked and the frost ruined them. We know of one case where a grower had between four and five thousand crates of Emperors ready for picking and the entire crop was lost, and he returned his shook and did not send a solitary crate forward.

We are dealing now with facts, not theories, and we sincerely hope that your committee will be able to so bring the matter home to the transportation companies that they will be ready to give you the relief asked for, as surely the amount prayed is small enough.

In regard to your last question, would say that we have found from experience that the average cost of properly picking and packing a crate of Tokays since the rain has been approximately 32 cents to 37 cents, depending somewhat on the

locality—some even claim that the cost is higher than that, but we consider the amounts given above about the general run this year in the heavy producing districts.

Concluding, we wish your committee all success in your undertaking, and we have no doubt from the able manner in which the question is being presented that something should be done, if the powers that be have any respect at all for the persons who are furnishing them the tonnage from which they are earning their transportation charges.

Respectfully yours,

W. C. WALKER, General Manager.

MR. STEPHENS. I wish to state that we state in conclusion that we realize that the only power existing that could give the relief was the railroad companies, and we relied on their honesty and integrity and ability to do so. The object in publishing these two communications from other railroads is a fair sample of about forty others we received, showing that the whole responsibility rests upon the initial lines of adjusting these rates which will be satisfactory to the growers and will permit them to make a reasonable profit.

Now, there is one peculiar thing about this. I don't know. The railroad companies may have a representative here, they may have somebody here that will assume to deny the correctness of the statements contained in this report. We would be very glad to have such the case. If we are wrong, we want to be shown where we are wrong, and we have tried to get a meeting with the railroad company, but have not been able to do so. In other words, they have closed up like a clam and have not said a word in the last six months except to acknowledge communications. They have not denied it, and therefore this must stand as positively correct, and why they have not some official here to officially represent them I can not understand. If their action is right, it ought to be easy for the railroads to show that. I would be pleased to have any railroad official, any other man representing them, come and attack the statements made in this report.

Well, gentlemen, here are the reports. I hope you will take them home and read them, because there is much more in them than has been read here, and upon giving the contents careful consideration you will see that our committee has proceeded in the most quiet manner. We have said to the railroad companies that we were not making a newspaper fight, that we were not appealing to the public for sympathy and support, that we were depending upon their judgment to right a wrong, to act in a manner that would permit the deciduous fruit grower to make a reasonable profit on the capital he has invested. We did not wish to come out in public one year ago and state the facts, the true conditions existing, because we believed that we would consummate our purpose in that quiet manner. We did not believe that the railroad officials understood the real situation, and we therefore had faith that upon the presentation of the facts in the case to the railroad officials they would accede to our demands and would grant them.

As Mr. McKevitt says, as Mr. Walker says, right now if they would grant this $1.15 rate which they have been giving for years to the citrus shippers, it would not be sufficient alone to bring a profit to many deciduous growers. We have asked for nothing but what they have been giving. We explain to them, in other portions of our letters, that we are not even asking for the rate which they had been giving for

years to the lemon interests, of one dollar, and the rate which they have been giving to you, gentlemen, here of one dollar. We ask for the same rate given to the orange shipments alone, and inasmuch as they have been giving those rates to those interests, is there any reason tenable why they should not extend the same rates and facilities to the deciduous fruit growers? I thank you, gentlemen. (Applause.)

MR. BILLS. Mr. Chairman, I move that the Chair appoint a committee of three to take up the matter of finance and help out paying for this report.

The motion was duly seconded and carried.

PRESIDENT JEFFREY. I will appoint Senator C. B. Bills, Mr. B. F. Walton, and Mr. J. P. Dargitz a committee of three to look after Senator Bills' motion.

The convention adjourned until December 9, 1909, at 9.30 A. M., but in the mean time the delegates, on the evening of December 8th, attended in a body a reception tendered them by the ladies of Watsonville.

THIRD DAY.

WATSONVILLE, Cal., December 9, 1909.

The convention was called to order at 9.30 A. M. by President Jeffrey.

PRESIDENT JEFFREY. Now, Mr. W. H. Volck, one of your honored citizens, will present "Insect Pests and Diseases of the Apple." (Applause.)

MR. VOLCK. With regard to this subject of "Insect Pests and Diseases of the Apple," it is a very broad one, and a paper to be presented and read before this convention must necessarily be of limited length; so, in order to make the matter in this paper more clear and perhaps take it up more thoroughly for those who are most interested, I have distributed around in the book racks of these seats two bulletins. You will find one in the other, and the outer bulletin, called "Winter Control of Orchard Pests," is just from the press, and this edition of 500 copies was made for the benefit of the State Fruit Growers' Convention, and we hope that it will take all of these bulletins. There may not be enough people in the audience to take them all individually, but you may have friends that you can distribute them to, and we would like to see that these bulletins go out, because they show in a concise manner all the work that has been done here, and they will make the matter in the paper more clear. These bulletins, I may add, are published at the expense of Santa Cruz and Monterey counties, which have heretofore supported this investigation, and in sending out a county publication broadcast over the State we feel that we are not advertising Santa Cruz and Monterey counties as a land of pests, particularly, but as a place where they know something about how to get the better of such troubles.

INSECT PESTS AND DISEASES OF THE APPLE.

By W. H. VOLCK of Watsonville.

The subject of insect pests and diseases of the apple is rather a broad one, and perhaps the best method of approach is to take a hypothetical orchard and carry it through the year. The necessities of this orchard in the way of treatment for diseases will vary with the locality, but there are certain general methods of procedure applying to all. Also, in California the great bulk of the apples are produced in the central and northern coast counties, well within the limits of the ocean influence. The Pajaro Valley is the center of this production, and in point of quantity California apples may be considered as the special crop of this locality.

Other districts produce apples, but as yet to a quite limited extent. The mountain sections have been developed slightly, and produce a type of fruit quite distinct from the coast. In the higher altitudes, free from fog, the growth of the trees is also different, and there is

less trouble with fungus diseases. These mountain districts may some day become quite important, as there appears to be an abundance of suitable land comprised in them. But, for the purposes of this discussion, it is best to locate the orchard, which is to be a model from the sanitary standpoint, in what is at present the center of the industry.

The climate of the Pajaro Valley and other similar localities is well adapted to the growth of apples, but not equally to all varieties. Aside from soil, climate may be considered the principal factor entering into the production of a crop. When plants are growing under climatic conditions favorable to their best development the inroads of diseases are reduced to a minimum because of the natural vigor so induced.

The cultivated varieties of the apple differ materially among themselves and from the wild species from which they were derived.

These differences in the varieties affect their tolerance of climatic conditions very materially so that a variety doing well under one set of conditions may fail in another locality. Then the selection of varieties suitable to the locality is the first step to take in the protection of the orchard from the inroads of pests.

In choosing varieties the commercial value has to be taken into account, for it would be useless to plant an orchard to thrifty growers which do not yield regular crops of salable fruit. The planting must then be made with those commercial varieties best adapted to the locality, and it is often preferable to select a lower-priced apple which will yield abundantly than a more fancy type producing poorly.

Of course, it is understood that the land must be suitable for the apple tree, neither too wet nor too dry, deep and moderately fertile. Fertility and moisture can be regulated by artificial means, but the depth must remain largely as nature provided it. Sometimes a lack of one of these requirements may be compensated for by supplying more of another; to illustrate, shallow soils may be made to grow good trees if fertilized and irrigated.

To name a list of apple varieties which will do well enough in a specified locality to make successful pest control possible is not a difficult task if all the conditions are known. Important variations in conditions, may, however, be found within a half-mile as regards the climate, and a few rods for soil and drainage. Such differences within a short distance renders general recommendations of little practical value.

In selecting the site for an apple orchard the soil should be surveyed to determine its adaptability to the growth of trees, and if there is any question about an abundance of water the practicability of irrigation should be considered. The climatic conditions are not so easily determined, as a long period of observation is necessary. By observing the growth of such trees as may be in the vicinity much important information concerning soil and climate may be quickly gained.

That pests are potentially present in the orchard before it is planted may be a new idea to some, but a heavy clay or adobe soil means woolly aphis on the roots, while light clay to sandy loams give comparative immunity. Cold winds and fogs bring about leaf spot diseases and favor the powdery mildew. On the other hand, warm sheltered localities are subject to the codling moth and scale insects.

Of the late summer and winter varieties of apples grown in the coast

districts the Newtown Pippin is perhaps the most exacting in its requirements. Cold winds and fogs stunt it badly and bring about leaf spot diseases. Fogs at more moderate temperatures induce serious infections with the powdery mildew, which also stunts the growth. On the other hand, it is a sure bearer and resists drouth comparatively well. On good soils, in a well sheltered locality, this variety makes a sturdy growth rather resistant to diseases, but is quite subject to the codling moth and apple scab.

The Yellow Bellflower, White Winter Pearmain, and Red Pearmain can be pushed much further into the zone of cold winds and fogs than the Newtown, but the bellflower may not bear well under these conditions. The Missouri Pippin and Langford should also be mentioned among those varieties which will endure a wide range of soil and climatic conditions. The bellflower requires a rich, well watered soil and may fail in localities where Langfords, Red Pearmains, Missouri Pippins, and Newtowns do well.

The varieties of early summer apples are less numerous, and Skinner's Pippin is probably the most adaptable, with the Red June a close second. Both of these varieties are relatively immune to diseases. The Gravenstein is subject to the powdery mildew and so should grow in sheltered localities.

All this information regarding the adaptability of varieties is the result of experience, and unfortunately a large acreage was planted before these facts were known. A good many of these orchards happen to be in localities where all varieties do comparatively well, but others show decided unadaptability for certain types. The Newtown has been badly misplaced, and is frequently seen to be so stunted as to be worthless. In such orchards the best practice would be to remove the hopeless trees and replant with varieties that will do well.

With such attention to preliminary details the orchardist is in a position to successfully combat pest, both because the insect and fungus parasites will not be so destructive and the trees will have the ability to withstand the injurious effects which may follow the application of certain sprays.

We are frequently requested to recommend some application which will bring the trees out better, but unless the natural conditions required to make a good tree are fulfilled this is impossible. On the other hand, where such lack of vigor occurs in orchards that naturally should be doing well, our present knowledge of remedial measures is usually sufficient to make practical recommendations possible.

The insect pests and diseases of the apple have been shown to vary in kind and character according to climatic and soil conditions, but there is apparently no combination of varieties and locality which will insure complete immunity. There are numerous insects and related organisms which make use of the apple as a food plant. Perhaps all of them are capable of inflicting serious damage under the proper conditions. Also, fungus and bacterial diseases, while not so great in variety, may make up for this deficiency by a greater virulence. If the troubles ended here they would be quite sufficient, but another group of diseases may be present. The reference is to those disorders which can not be attributed to a parasite, and are called physiological diseases.

If all of these parasites and diseases were present, in destructive

form, the task of the apple grower would be a hopeless one. So, in the hypothetical orchard we will assume, as is always the case, that only a limited number need be considered. The sap-sucking insects most likely to be present are the San Jose scale, greedy scale, and woolly aphis. The leaf feeders and other chewing insects will include the codling moth, tussock (horned) caterpillar, cankerworms, and the tent caterpillars. Of the fungus diseases, the apple powdery mildew, apple scab, and wood rot or sappy bark disease are most important. A physiological disorder, known as "leaf spot," may also be present.

Even this limited list may have only a few representatives in a given year. In the coast districts those recurring most persistently are the codling moth and apple powdery mildew, with the scales and woolly aphis a close second. The apple scab is more often absent than present, and the caterpillars are subject to very marked fluctuations extending over a period of years.

The insects here considered are divided into two classes, according to the manner in which they take their food, that is sucking and chewing. The scale insects and aphids suck the juices from the inner tissues without eating the surface, while the caterpillars eat the substance of leaves and fruit.

The San Jose scale is an insect which passes the greater part of its life under an armor or scale formed by the secretions of special glands. The youngest stage of the insect resembles a minute louse and crawls about over the tree in search of a suitable spot to locate for the remainder of its life. These young are also carried by the wind, birds and other agencies to distant trees, thus spreading the infestation. Potentially, these young are not very potent under balanced conditions. Not more than one hundred succeed in locating and the number may be much less.

After locating the insects are still subject to death from various causes so the number reaching maturity is still further reduced. When the San Jose scale it probably does not change location, and certainly is unable to do so after a time, for the legs are lost. This scale matures quickly, for as high as ten generations have been recorded in a year. The young are born alive and continuously for a considerable period. In California the winter is passed by both adult and immature insects, the first young appearing in February and March.

The injury caused by the San Jose scale is caused by the injection of a toxic substance into the tissues of the bark, and is proportional to the number of insects present. The scale may be so numerous as to form a continuous crust over twigs, limbs and even the trunk, or there may be only a scattered infestation on the small twigs. In the first case death of limbs and perhaps the whole tree may ensue, but with the lesser infestations the injury may be confined to a few red spots on the fruit, caused by individuals which have located on the apples in May and June. The red stain is quite a constant character, and the inner bark of infested branches is deeply colored. The San Jose scale is not confined to the apple, but attacks several other species of trees and shrubs. It is supposed to be a native of northern China.

A number of other scale insects are closely related to the San Jose scale, and have similar life histories. We have spoken of the greedy scale, this is a larger species than that just described, and has a more

substantial armor. On the other hand it is less virulent, seldom becoming numerous enough to form a continuous crust. Also, it is less poisonous to the host, not producing a colored stain or killing the attacked parts. The injury appears to be confined to the stunting of the growth, in the worst cases, and dead leaves may hang over winter on infested trees. Without causing serious injury to the tree this insect may bring about considerable financial loss through its habit of locating on the fruit. The presence of the greedy scale on the fruit causes rejection in some markets.

To successfully combat scale with sprays it is necessary to use some wash which will kill by contact with the surface of the insect's body. Poisons taken internally are not effective because the habits of feeding prevent the imbibing of such substances applied to the surface of the bark as a spray. On the other hand contact with the bodies is rendered difficult because of the armored protection, and strong penetrating washes must be used. Sprays capable of killing scale are too caustic to permit of use on foliage, and so must be applied while the trees are dormant or before many leaves have developed.

A list of scaleicides will include the lime-sulphur solution, rosin soap, whale-oil soap, distillate oil, and mixtures of oil emulsions with lye. For general purposes the lime-sulphur solution should be chosen.

To continue with the discussion of insect pests, the plant lice or aphids still remain to be considered in the class which are not controlled by stomach poisons. The aphids feed in the same way as the scales, but differ in some other respects. They are larger, and not protected by a scale or armored covering, but in the case of the woolly aphis a wool-like substance acts in much the same way. The aphids can change position at any time, but if not disturbed may not do so. Propagation is by means of both eggs and living young, and the unrestricted rate of increase is stupendous; but aphids have many enemies including insects and fungus diseases. Weather conditions also have a great influence on them, and the combined effects of all may be so great as to almost exterminate the plant lice.

The woolly aphis is the most persistent species attacking the apple, and, perhaps, the world over, causes as much damage as any of the scales. This aphid infests both the tops and the roots, and under California conditions one form is always present, that is, females which give birth to living young. Contrary to the general impression, the top infestations are practically independent of those occurring on the roots. In soils of light or sandy texture the roots may not be attacked, but frequently abundant development occurs on the tops. Wintering-over above ground is easy, in this mild climate, and small ones are often found under the protection of rough places in the bark. The woolly aphis multiplies rapidly in the spring and soon infests many of the twigs, forming compact colonies, which become conspicuous by the development of the white woolly covering. The same increase occurs on the roots, but the subterranean form usually has its greatest development later in the season. The toxic substances injected into the tissues of the tree produce disturbances in cell growth resulting in the development of galls and warts. On the roots, these galls frequently interrupt sap flow and bring about decay. The tops are also stunted in the same manner. In addition to the poisoning, a large quantity of sap may be

removed, so taxing the vitality of the tree, and the excreted honeydew produces a very objectionable gumming of the foliage and fruit.

Contact insecticides must be used for the woolly aphis, but the lime-sulphur solution, so valuable against scales, is not very effective for this insect. The oil emulsions and nicotine washes give better results. Something can be done towards controlling the top form by going over the trunks and large limbs, very thoroughly, during the winter with distillate emulsion. The object is to kill the colonies wintering in the protection of the rough bark formation about wounds. The application has to be very thorough to insure penetration.

This winter treatment may not have killed all the colonies of the woolly aphis, so nicotine applications may have to be made in the summer. The root form of the aphis is not readily reached by any treatment, but the crown can be largely protected by removing some of the earth and pouring in a quantity of tobacco decoction.

Of the chewing insects the codling moth is probably the most important. This species is estimated to cause a 40 per cent loss to the apple crop of the world. The codling moth passes the winter as a mature worm or larva, well concealed and protected by a cocoon, not always on the trees, but frequently in the ground, fences, and old buildings. In the California coast districts these wintering-over larvæ do not pupate and emerge as moths until the middle of May, and then not completely, for numerous moths appear even up to the middle of June. After the appearance of the moths it is not long before eggs are laid, and the young worms hatch some ten days later. The early eggs are deposited on the upper surface of the leaves, and somewhat later the under surface is frequently chosen. Not until the fruit rind has become quite smooth and free from hairs are the young apples selected in preference to the leaves. Eggs are seldom if ever laid in the calyx cavity.

The young larvæ of the codling moth, when hatching upon the leaves, frequently have to crawl considerable distances before reaching an apple, and may feed to some extent on the foliage. The larvæ have been reared to maturity on the foliage alone. Many of these exposed young may perish, and even after entering the fruit, death frequently occurs from diseases and other causes. Of those individuals which succeed in reaching the fruit, 50 to 75 per cent enter at the calyx. The remainder bore in from other points, generally beneath a protection such as the contact of a leaf or two apples. Once within the fruit a more or less direct course to the core is taken. Here they feed and grow until maturity. The seed are consumed as well as the tissues of the core, and the destruction of the sap-conducting vessels often stops the further growth of the fruit which fall, from this cause, during July and August. The time required for the development of the larvæ is about thirty days. When full grown the first generation worms emerge from the fruit and shortly spin cocoons under some protection. Transformation into adults takes place quickly, requiring ten to fifteen days. The moths so produced lay eggs which give rise to the second generation worms. The eggs of the second generation are laid largely on the fruit, and frequently in the most exposed places. The young larvæ also appear to manifest the same indifference to shelter and enter the fruit at any point, choosing the calyx only by accident. Codling worms of the second generation begin to appear strongly about the middle of August,

but are in evidence, in numbers, late into October. These second brood larvæ are much more numerous than those of the first generation, and cause the most damage. The great majority of the second generation worms have the wintering-over instinct and so do not develop into moths until the following spring. A summer generation requires about sixty-five days, so there is a possibility of a third brood in October.

Sprays applied during the winter and contact insecticides in the summer are of little or no value in the control of the codling moth. Poisoning with arsenic has on the other hand proved very effective when the spraying is done at the proper times. The compound of arsenic should be sufficiently insoluble to enable its free use without danger of foliage injury, and the applications must be made just before the most important hatches of the worms. Numerous compounds of arsenic have been proposed, but at present arsenate of lead meets all requirements best.

Some confusion has arisen from the fact that there are two theories of spraying and two kinds of arsenate of lead. The two lead compounds are known as pyro and ortho arsenates. The pyro arsenate contains a greater amount of arsenic than the ortho compound, and so is a more active poison. It also releases some arsenic to water solution, rendering use in the coast climates dangerous. The ortho compound, on the other hand, is safe under these conditions.

The two theories of spraying have likewise originated under opposite climatic conditions. In the dry interior it has been demonstrated that the calyx cup spraying is most important, and may even be so effective as to render further applications unnecessary. But in the rain belt of the Pacific coast and also in many other sections of the country, the relative value of the calyx cup application is not nearly so great. In California coast districts applications for both broods must be made, and will include three or four sprayings, according to the abundance of the codling moth.

The other caterpillars mentioned in the list of apple insects are normally leaf feeders, appearing in the early spring and coming to maturity before the middle of June. April and May are the months of caterpillars. Many caterpillars have but one generation a year, and this is true of tent caterpillars, tussock caterpillars, and cankerworms. The tent and tussock caterpillars pass the winter in the egg stage. These eggs are deposited on the trees by the moths in June and July, but do not hatch until the following spring. The female moths of the tussock caterpillars are wingless, so distribution is effected by the migration of the larvæ and the accidental transportation of eggs and young caterpillars. Two species of cankerworms are present, called fall and spring cankerworms. Like the tussock caterpillar, the female moths are wingless, but the eggs are not laid in the early summer. One species deposits late in the fall while the other waits until the early spring. The adult larval and pupal stages are passed in the ground under the trees, so the wingless females are obliged to ascend the trunks in order to lay their eggs.

The tent caterpillars and cankerworms injure the trees by defoliation, and must be quite numerous before serious damage is done. Complete defoliation by caterpillars destroys the crop for two years. The tent caterpillars spin a web protection capable of covering the whole

colony, and to which they return when not feeding, but the canker-worms live individually, and have the habit of spinning down from the tree on a web when disturbed.

The tussock caterpillar is capable of doing considerable damage even when present in small numbers. This is due to the fact that it attacks the young fruit, eating out portions which afterwards develop into rough scars that detract much from the appearance and value.

Treatment of caterpillars has to be modified according to their habits and character. The tent caterpillar and cankerworms are readily controlled by spraying with arsenate of lead, and so no special treatment need be given when applications are made for the codling moth. On the other hand, the tussock caterpillar is not readily poisoned, and it is more practical to pick the eggs from the trees during the winter than to rely on arsenicals applied later. The eggs are laid in masses about the size of a pea, and may be found on most any part of the tree, often attached to the old cocoons. The white to gray color of the egg masses makes it possible to find them rather readily, but very careful work is necessary with large trees.

Caterpillars are subject to great fluctuations in abundance, due to the attacks of parasites and diseases. These natural enemies may nearly exterminate the species at times, but again their absence for several years allows a destructive increase of the pests.

Coming now to the fungus diseases, the apple powdery mildew is the most important. Under climatic conditions favorable to it, the persistent attacks of this fungus keep the trees from making the proper wood and foliage growth. The vigor of the tree is thus much reduced and many unfavorable conditions develop.

The mildew is a fungus parasite which thrives on the surface of young leaves and growing shoots. It spreads over the attacked parts and resembles a mold, both in appearance and odor. The fungus is propagated and distributed by means of spores or seed-like bodies. These spores, although microscopic, are produced in such enormous numbers as to form a white powder, which is often abundant on mildewed shoots. The spores are distributed by the wind.

Treatment for the apple mildew has, until recently, been impractical, because the fungicides in common use had little effect upon it. Winter sprays have not proved effective because the fungus is in a very resistant state during the dormant period. Sprays, to be effective, must be applied in the spring and early summer, and some form of insoluble sulphur should be used. We have experimented with a large number of sulphur compounds, and the best among them is the iron sulphide spray, now recommended. Three or four sprayings are required, but fortunately these fit very nicely into the codling moth schedule, so that only a small additional cost is entailed. The Bordeaux mixture is not effective.

The apple scab is another fungus disease which may prove serious if there is much rain during April and May, but dry springs reduce the damage to a minimum. This fungus grows within the tissues of the leaves and fruit, and forms spores on the surface which resemble a dark brown powder or soot. The spores are carried by the wind, and when deposited on apple foliage or fruit will start a new infection if sufficient moisture is present. The injury consists in the scabbing of

the fruit, and also the killing of the young fruit if a bad attack occurs during the blooming period. Spraying for the apple scab is quite effective if properly timed. Winter applications of lime-sulphur solution check it materially, but a Bordeaux spraying in May is advisable if spring rains are abundant.

The sappy bark disease and wood rot is much in evidence in the humid coast districts. This disease is probably parasitic, although the specific fungus has not been determined. The trouble is active during the winter and almost ceases in the summer. It starts from wounds, and appears first as a puffy condition of the bark, which later becomes watery. The bark dies and the wood beneath is attacked by a rot, which continues from year to year. Large limbs are killed, and the wood rot eventually enters the trunk, resulting in the death of the tree. In treating this trouble the diseased limbs should be cut away considerably below the infection. The disease may start again in the stub, so it is well not to go too far back towards the trunk in making the cuts. Prevention is better than cure, and as the disease starts in unhealed wounds, the removal of large limbs should be avoided, and all pruning confined to branches under two inches in diameter.

We are now ready to consider a schedule of spraying and other treatments which will meet all of the conditions previously discussed. It is important that the sprays used should have as wide a range of efficiency as possible, and at the same time the application be attended with a minimum of injury to the trees.

For winter use the lime-sulphur solution meets all these requirements best. This lime-and-sulphur compound can be used on dormant trees at any strength, but the contraction now recommended for general purposes is 3½ to 4 per cent of dissolved sulphur. This concentration is obtained by diluting one part of the commercial 33-degree Baumé solution with nine parts of water, or preparing a solution by the following formula: Lime 33 pounds, sulphur 66 pounds; boil these together in 50 gallons of water for forty-five to sixty minutes, or until the sulphur is dissolved. After boiling, strain out the coarse impurities and dilute with water to make 200 gallons. This dilution should be applied with great thoroughness, so as to drench the entire surface of the tree. Best results are obtained when a period of dry, warm weather follows the application. For this reason spraying early in December or when the buds are bursting in the spring is usually most effective. The latter date is certainly best for apple scab control. If the greedy scale is abundant, two applications should be made with some time intervening between them.

The lime-sulphur treatment is effective against the armored scales, moss (lichens) and the apple scab, but there may be a few trees which are badly troubled by the woolly aphis. In this case the trunks and large limbs may be sprayed with an 8 per cent distillate emulsion. The application should be made during the coldest weather in December or January, because the colonies of the aphis are then smallest and least numerous. Great thoroughness is necessary in order to penetrate all the crevices in the bark. After spraying, the wet earth about the trunk should be removed. This is a precaution to prevent killing the root crown by prolonged contact with the distillate oil. If the crown is

found to be infested with the aphis, it is well to pour several gallons of a strong tobacco decoction into the basin and then refill with new earth. In addition to spraying, the trees should be examined for tussock caterpillar eggs, and sappy bark disease infections. The latter trouble may require several inspections during the winter to prevent undue spread of the disease. Cutting off the infected branches is advised, except when these are large and only have one side attacked. In such cases cut away the diseased bark to healthy tissue, and then watch carefully for further outbreaks.

With the advent of spring the most important consideration is the control of the codling moth, but the powdery mildew is a close second and even more consequential in some localities. We will take up the two cases, first the control of the codling moth alone, and second with the mildew. Provided there is no necessity of spraying for the apple scab, the spring and summer applications will contain only arsenate of lead. Four thorough sprayings with this material, and properly timed, will insure practical control of the codling moth, tent caterpillars and cankerworms, as well as several other leaf feeders. The first application is due when the majority of the blossoms have fallen, from the middle of April to the first of May. The second spraying comes in the latter part of May and the third about the middle of June. It is possible that these three sprayings will be all that is required for the control of the codling moth, but experience has taught us that in many cases this early work is not done thoroughly, and the second-generation worms may be numerous enough to cause considerable damage. To meet this contingency a fourth application of arsenate of lead should be made between the middle of August and the first of September. The correct amount of arsenate of lead to use in all of these applications is about 2 pounds to 50 gallons of water, and the neutral or ortho compound should be chosen in order to avoid foliage injury. Thoroughness of all the applications is a point quite as important as the timing, and failures which have occurred are easily explained as the result of improper use without assuming any fault in the arsenate of lead.

This statement of procedure covers the simplest general condition, but arsenate of lead is an insecticide only, and even its most thorough use leaves the trees exposed to the attacks of fungus diseases. When there is much rain in April and May the apple scab is to be feared, for the lime-sulphur applications in the winter may not have been sufficiently effective to prevent all injury. Under these conditions the first application should include the Bordeaux mixture. A suitable Bordeaux-arsenate of lead mixture can be prepared by following these directions.

Three pounds of bluestone dissolved in 10 gallons, and four pounds of lime slaked and mixed with 20 gallons of water should be poured together and well agitated. The arsenate of lead and water necessary to make 50 gallons is added to this mixture.

Bordeaux may russet the fruit if the application is followed by rains, and bellflowers should never be sprayed with it, as this variety is easily russeted and but little subject to the scab.

The second case to be discussed is that which includes the control of the powdery mildew. This may be accomplished by adding iron sulphide to the early codling moth sprayings, and inserting an additional application. The timing of these applications throws them about two

weeks apart as follows: May 1st; May 15th; June 1st, and June 15th to July 1st. Arsenate of lead is used with these applications at the rate of 2 pounds to 50 gallons for the first two, and 1 pound to the same quantity of the second two. The August and September sprayings are to contain arsenate of lead alone.

The iron sulphide under discussion is a complex compound formed by the reaction of the lime-sulphur solution on a solution of copperas (iron sulphate). A 200-gallon quantity is prepared as follows:

Dissolve 15 pounds of copperas in a 50-gallon barrel, two thirds full of water, and then add 13 quarts of the 33-degree Baumé (commercial) lime-sulphur solution; add water to fill the barrel and agitate thoroughly. A thick black precipitate is formed, and, if, as there should be, there is a slight excess of the lime-sulphur solution a reddish liquid will separate. Allow to settle for twelve hours and then pour off as much of the liquid as possible without loss of the black precipitate. Repeat the operation of filling the barrel with water, agitating, allowing to settle and decanting, four or five times, or until the excess lime-sulphur solution is washed away. When the washing is complete the mixture is ready to dilute with water to make 200 gallons of spray. Arsenate of lead is added while diluting, along with the water.

When iron sulphide is used, there should be no need of the Bordeaux mixture, for the results of our experiments indicate that the mildew spray is also effective against the scab. In spraying for the mildew special effort should be made to wet the tips of the growing shoots as these parts most need protection.

The use of iron sulphide for the mildew is just emerging from the experimental stage, but we are prepared to say that young orchards, from the time of planting until coming into bearing, will be greatly benefited by five or six applications, as the growth is greatly stimulated. Older trees are also much stimulated in growth, but the first application is likely to shock the tree and cause the dropping of some of the young fruit. This shock is apparently due to the especially delicate condition produced by bad attacks of the mildew and may be expected to disappear when a normal condition of thrift has been restored.

The following points should be remembered in the use of iron sulphide for the mildew: One or two applications will produce little or no effect, because the infection of the young growth is continuous during the growing period, and so the protection must be continuous. There may be some dropping of the young fruit as a result of the use of the spray, but this loss should be compensated by increased growth and vigor resulting in better future crops.

The discussion of these general methods of procedure for the control of the most important apple pests is scarcely complete without considering some of the special problems which may come up incidentally. The woolly aphis was mentioned under winter treatment, and the statement was made that this insect might require further treatment during the summer. Aphids of various species develop rapidly at times, and the apple in California is subject to the attacks of at least three. The woolly aphis, green aphis, and leaf-curling aphis may all become abundant enough at times to inflict serious injury. These insects are all soft bodied and easily killed with contact insecticides when actually

hit by the spray. On the other hand, multiplication is so rapid that a few remaining individuals can quickly reinfest the tree. For this reason it is unreasonable to expect any one spraying to control aphids for the whole summer, unless the application happens to be so happily timed as to reduce the numbers of the insects to a point where some natural enemy or condition, already struggling with the pest, can conquer them. Natural enemies of the aphids usually get the upper hand in time to prevent very great damage from these pests, but a few trees may suffer greatly from attacks of plant lice, often the same ones year after year. In such cases treatment is advisable, and sprays should be applied whenever conditions require.

In spraying for aphids it is necessary to use large quantities of the wash, forcefully applied, from all directions, in order to insure contact with the bodies. For this reason the spray material must not only be a good insecticide, but also free from foliage injuring properties. The best aphis sprays that have come to hand are the nicotine and tobacco washes. Nicotine is effective against aphids when used in dilutions as great as fifty hundredths of 1 per cent, and is not known to injure foliage even at much greater strengths.

Tobacco decoctions containing the required amount of nicotine can be prepared from refuse stems, dust, etc., and a wash strong enough for aphids is obtained by steeping a pound of such material in a gallon of hot water for several hours, then diluting with an equal quantity of water after straining. The addition of some soap will much increase the efficiency of the spray, as it gives better contact and helps to retain the nicotine. A pound of soap (whale-oil or other) to 20 gallons makes a good mixture.

Spraying is at present the main reliance in the control of apple pests, but there are cultural methods and ways of handling the fruit which may add materially to the total results. Thorough thinning of the young apples makes protection by spraying much easier as the points of contact, which afford protection to the worms, are not so numerous. The complete and immediate removal of the fruit when picked is also a good practice for most of the wintering-over generation worms are still in the apples. This is especially true if the picking is done before the middle of October. Often the good fruit is quickly removed, but the culls and windfalls are allowed to remain and rot on the ground. This is a bad practice and may be the means of harboring more than one pest. This cull fruit is now becoming valuable for drying and canning purposes, so there is a greater disposition to make a thorough clean up with consequent improvement in conditions.

In closing this paper I feel that much of importance has been left unsaid. There are many pests of the apple which have not been mentioned. Fortunately, a number of these are not present in our orchards, and we are trusting in an efficient quarantine service to keep them out. In the mean time knowledge of methods of control both by artificial means and the assistance of natural agencies is making rapid progress. What has already been done gives us confidence in our ability to cope with most, if not all, contingencies and assures the future of the industry. (Applause.)

PRESIDENT JEFFREY. Colonel Irish will now speak on the subject, "After Fruit Production, What?" (Applause.)

MR. IRISH. *Mr. Commissioner, and Ladies and Gentlemen:* Before I begin speaking you will permit me to say something. There has arisen, not only in California, but throughout the republic, a problem that has been for years under observation, which concerns very materially, not only the economics of agriculture and horticulture, but the social and general life of the people. This problem is the lapse of the young of the country, reared under rural conditions, from those conditions to the city. In the period of our Revolutionary War only 3 per cent of our people lived in cities, and 97 per cent of the men of brawn and the women of courage who went through that great struggle in which our liberties were established were rural people, living under country conditions. Now nearly 35 per cent of our population is in cities, and that population is on the increase yearly. This lapse of young life from rural districts and rural occupations is a problem that is being considered by economists and publicists all over the country.

There is no doubt that man—ancient man—regarded his relation to the land and its fruits as one of the most important to him. In that book of Genesis, no matter what opinion we may have of its authenticity as an historical narrative or of its value as an inspired book, there is something that appeals directly to all men, and that is that part of a tradition that is traced away back into Assyrian sacred literature, in which an attempt is made to account for the presence of man upon the earth as a part of the universe. As I say, whether it be of value as an authentic historical statement or not, it is of the highest value to every thoughtful person as an expression of ancient man's opinion of what constituted nobility of descent. It is in that verse, "God created a garden eastward," and that was Eden, and out of that garden, equipped with everything that grew upon the ground and upon vines and trees—except, perhaps, with the loganberry, which is a modern creation—in that garden man concluded he would place his origin, his initial point. It has, I say, the highest value as an expression that ancient man believed in his descent from the soil. Now we are starting away from that ancient idea. The young of the country do not place that high value upon descent from the soil that ancient man did. In your country schools and in your schools in cities like this, a boy may learn, in the literature with which he comes in contact, all about the glory that was Greece and the grandeur that was Rome; he may learn all about wars and captains and commanders; he may acquire, through the observation of literature, a knowledge and fondness and an imaginative tendency toward every occupation on earth except the rural industries. He picks up a city newspaper—we call it a metropolitan paper—and what does he read? He reads there the pleas of lawyers made to juries and to courts; he reads the sermons of gifted preachers; he reads about the cures and great achievements of physicians and surgeons; and when he looks through that metropolitan paper for something which relates to the occupation in which his father is engaged, he finds the farmer pictured as a hayseed, wearing whiskers cut on the pattern of a goat's, with a toothpick in his hand and saying "By Heck" and "Gosh-all-hemlock." [Laughter.]

Now, what is the effect of all this? It is to captivate the imagination of the boy with the glories and the splendors of the city, of the excellence of the work in the professions, and to inspire him with contempt

for the occupation of his sire, the old hayseed with a goat beard on his chin, chewing Star tobacco and saying "By Heck" and "Gosh-all-hemlock." That is what he absorbs from the literature with which he comes in contact. The only way to train a child is to train him when he is young. One wise person went further than that when penal reform was under discussion, when he said, "The way to begin reforming young Smith is to reform his grandfather." But in this respect it is time that the people of this republic teach, through all the agencies that instruct the young, that there is something in the world besides war, that there is some glory beside that won by commanders who lead hosts to slay. It is time that we began in our schools, both country and city, to teach that the foundation of all things is in the tilling of the soil and that, therefore, to the tiller of the soil is due the first honors. It is time that we should go back, if necessary, to Virgil and Pliny Secundus and have some man among us who shall originate a literature that shall teach the utility, the romance, the imaginative elements that are in the rural occupations of the republic in every one of its states, so that, through the literature absorbed in the schools, our young may find out something about that great industry upon which all other industries depend.

"God planted a garden eastward in Eden." It was a garden. How inane and silly that line would be if in Genesis it had been said that God planted a brewery eastward in Eden or a drug store or a lawyer's office [laughter], or something else of that sort, but he planted a garden completely stocked with things that grow in the ground, and it is well to go back to that. The Agricultural Department in Washington, to which we owe not only the millions and millions that it has added to the crops of this country by increasing the fertility of the soil, but a mighty stimulus that has gone through all the nerves of the agricultural and rural people of this country, a stimulus that is beginning to teach them that scientific agriculture is one of the highest of all the arts, that it deserves to rank with what we call the learned professions, with law, physic, and theology. We owe all this to the Agricultural Department; but that corps of splendidly trained gentlemen in that department have observed the necessity of beginning in the schools of the country, teaching the young something that will interest them in agriculture, and to that end that department has undertaken by the spread of bulletins to impress upon the people of the country especially the need of introducing something about agriculture and horticulture and their allied arts into the public schools.

Why, think of it. You just listened here to a splendid paper that will go into your transactions and be a text-book upon the subject, a splendid paper upon insect and fungus pests, involving that most interesting subject, vegetable pathology. We call the doctor who cures us of a stomach ache or a soft corn or an ingrowing nail or something of that kind. The vegetable pathologist, who finds out vegetable diseases, is following a profession much more difficult to practice successfully than that of the physician, because we can tell where our pain is, which rib hurts and where the rheumatism is attacking us and in what kind of weather, but the vegetable can not utter its complaint. The study has to be entirely from the external, and vegetable pathology opens out to young men with a scientific turn one of the most important

fields of human endeavor, relating to the stability of our crops and the volume of their production.

In your Agricultural Department in Washington some years ago, when they began on vegetable pathology, they found one man in the United States who was a vegetable pathologist, and at that time the munificent salary attached to that position was $1,800 a year; and that man went into a pathological laboratory and patiently began his labors for that small salary. Pretty soon the observant government of Japan got its eye upon him, and there they must make every square inch of soil produce all the food it will, and their rice and other food crops were afflicted with diseases, and that government knew that it must find a vegetable pathologist that knew what those diseases were and could suggest their remedy, and so that government picked up this man from the Agricultural Department getting the munificent salary of $1,800 a year and took him to Japan under a seven-year contract at $7,000 a year. So, if we begin in our public schools teaching the rudiments of agriculture and horticulture, teaching the labor that should be done at seed time and at harvest, but teaching the necessity of studying the enemies of that crop who reduce its yield, which reduce not only the profit of the producer, but the quantity of food that will go to the mouth of the consumer, pretty soon the country boy will look upon his old father as something more and better than a hayseed and will listen, not with disgust, when the old man does say "By Heck" and "Gosh-all-hemlock." In order to effect this the Agricultural Department has begun a propaganda. It has issued a series of very interesting bulletins and pamphlets on the subject. It sent me the other day a few of them and I will leave them here, and I want each one of you to get a copy as far as they will go. There may be some men here who are school directors in rural schools and city schools. And another thing. These same things relating to agriculture and horticulture should be introduced into the city schools to let the city boy know that there is, beyond the limits of his town, pursued by faithful and toiling men and women, that occupation, the tilling of the soil, which George Washington said was the most noble, the most healthful and the most useful occupation of man. And so instead of the lapse of the country boy to the city we will have a hegira of the city boy into the country, led there by having his imagination fired by the story of rural life. Now, that is what I wanted to say. Now I will go on and speak. [Applause.]

"After Fruit Production, What?" Gentlemen, the time when roast pigs all stuffed and seasoned were running around the county roads in California begging people to eat them has gone by. [Laughter.] The representation to a coming stranger who desires to invest in land that all he has to do is to buy a piece of California land and sit down and look at it and it will make him rich, should cease. The State Board of Trade, of which I have been a director with Mr. Briggs and Mr. Maslin and other gentlemen for the last twenty years, esteemed it its function for some time to promote the fruit industry and fruit planting. Some time ago, however, we consulted upon that subject, and we made up our minds that the time had come to cease promoting the expansion of production in this industry, that the attention of the people should be turned to something else; that an industry which was shown

by my friend Russ Stephens yesterday can not stand a freight transportation to its market of one cent and fifteen one-hundredths, and that even a transportation charge to a market 1,300 miles away of one cent per pound will not prevent loss, that industry must turn its attention to something else than the expansion of production. It must turn its attention to a market, to the means of reaching it, and to holding that market profitably. So the State Board of Trade concluded that the best thing to be done by the fruit men of California is to stop talking of expansion, the extension of plantations, and to devote itself to the production of quality, to the standard packing of its fruit, and to reaching a market that will take its product at a profit to the producer, and that market when reached will be subject to expansion in its turn. Let production stand where it is, then, and let us devote ourselves to a profitable expansion of our market, and when that expansion of the market has caught up with production, then naturally it will be business in California to begin to talk about expanding production. But first catch your market, let it expand up to the present supply that you have, and when that has been done then every acre planted after that will promise to its planter a profit after coming into bearing. So the State Board of Trade has devoted itself to the fruit industry faithfully and honestly in its statistical statements, but it has begun to encourage other forms of rural industry in California with the same vigor and energy and truthfulness and confidence with which it formerly encouraged the fruit industry, but standing ready to help it take care of itself, as Mr. Briggs will tell you later on, standing up and resisting the encroachment upon it threatened in the sulphur matter, enabling it to reach its market, to reach a profitable disposition of its product, but letting expansion wait until the market has been found and has profitably expanded up to our present capacity of supply.

Now, in the first place, I think that it is highly necessary to study the standardization of the pack. In that respect no one can estimate the value of the work that is being done by Mr. Jeffrey. He is holding meetings, which I have attended in many instances, among the fruit growers, preaching to them the absolute necessity of observing commercial honor in their pack. You must first have a pack that is of the character and quality demanded by the distant market, and that character and quality must be carried to that distant market. You will not be confronted when there with: "I have bought some boxes of Watsonville apples since they began coming into the market this season, and I found the top layer splendid, but the other layers were a disappointment." Let the growers organize. That has been talked to you here and the example of the citrus growers of southern California has been held up to you. Let the growers organize, let them make an ironclad organization, but when they have made that let them understand that they must not use the power of organization to force upon the packer inferior qualities of fruit. A great many men feel that when they belong to a powerful organization they can compel the packer and the final factor, the consumer, to take what they choose to bring. You have borrowed that from the labor unions. When the mechanic depends upon the power of the union behind him and not his skill or fidelity he will exert neither skill nor fidelity. We who live in cities know this to our sorrow. But you must discard this leaf out of the policy of the

labor unions and use your organization to compel every part if it to observe the principles of commercial honor when you take your product to the man who is to be the factor and send it to the distant market. [Applause.] We often hear—and I have had some of the same experiences—about the sins of the commission man—and his sins are as scarlet, there is no concealing it [laughter], but the commission man is a psychologist; he has had experiences with many and many a rural producer and he knows that that rural producer, if he can do it, will send him a Christmas turkey with a stone hidden in its insides or he will send him inferior fruit; and so when the man from the country gets back no profits for his shipment, but a bill for his freight and goes down to jaw it out with the commission man, the still small voice of his own conscience tells him that he didn't do square with the commission man in the first place. Be square with yourselves, absolutely, and you will be astonished to find out how soon you can make every other man be square with you. Be square with the consumer, with your commission man, and when you make your organization make it ironclad, and demand that it shall compel every member of it to be square [applause], and when you do that you have taken the first great step that will lead to your prosperity and your finding of a market. In the first place, then, the standardizing of your pack, to get to the consumer in the very best condition, the very best quality that can be produced. Then attend to your transportation matter. I don't think you can ever get the railroad companies to go into partnership with the fruit producers in California. I have this criticism to make of what Mr. Stephens' committee has done, that it is continually saying to the transportation companies, "We want you to give us a rate that will protect us from loss." Suppose the railroad company says, "All right, gentlemen, we will do that, and then when we protect you from loss we want you to divide the profit with us; we are in partnership." That won't do. I don't think that transportation anywhere in the world is done upon that system or that principle. I sympathize greatly with your effort to get the lowest transportation rate possible to reach your distant market. When the interstate commerce bill was under discussion I was editing a newspaper in San Francisco, and when it was under discussion before congress to fix a uniform rate per ton per mile all over the country, I saw at once that that spelled ruin for the California producer, that there should be a differential permitted upon a long haul, and that a long haul should be made by a railroad upon a less rate per ton per mile than a short haul. And so I went to Washington and I dealt with Mr. Reagan, of Texas, and other gentlemen, and perhaps had a small part in procuring a differential, a less rate per ton per mile upon a long haul. Now, what did I find out? Here were the fruit growers of Georgia, the orange men of Florida, the apple growers of Nebraska and Iowa, fighting like soldiers against that differential clause. Why? Look at it as it is to-day. You will find those men, when a train of California fruit goes by, frothing at the mouth because, after all, it is going to the market at a less rate per ton per mile for the long haul. They have the short haul and you have the long haul. There are so many intricacies in the fixing of the freight rates that I think we would all be fit for the insane asylum if we should try to straighten it out; but certainly, the voice of a great industry that supplies so much profitable tonnage to the railroads that reach this coast must be heard in reason

by the men who control the policy of the transportation companies that carry that product to market, and I am satisfied that sooner or later you are going to get your rate, not in partnership with the railroad companies at all, but by their fixing a rate that they will be justified to their stockholders in fixing, that will greatly approximate your desires, and when you get that rate don't profane the arrangement that has been reached by so many prayers and tears and sacred and profane methods, as that will have been reached—don't profane it by making it the vehicle of sending to your market inferior product.

I have long been satisfied that there is in the world a profitable market for every pound and pint of California fruit product, either in its primary or its secondary or its tertiary forms. That market you should reach but you must reach it, as I say, with your product in first-class shape. Why, see how easy it is. Some years ago, when the late J. Sterling Morton was Secretary of Agriculture, he visited this coast and we gave him a reception in the State Board of Trade, and he was asked to talk about the marketing of California fresh fruit in London, which had begun not long before, and he stood up and told the story. He said when the sending of California fruit to London began he sent two representatives of his department there to study the effect when it landed. He said when the first lot was exposed for sale in London it was found that there was one lot of fruit that was absolutely perfect in quality and in packing, and that sold for the highest price. The next shipment came along, another lot under the same brand, and that was opened and found in exactly the same condition as to quality and pack. When the third shipment came the fruit under that brand sold at the highest price without the package being opened; it had established its reputation. He was asked whose fruit that was and he said Frank Buck, of Vacaville. He had by that simple process established his trade-mark in distant London. At the end of the season of 1894—it had been a hard year for all of us, the year of the railroad strike—I met Flickenger, of San Jose, the canner, and I said, "I suppose you are busted, like everybody else." He said, "No, I sold my pack at as good a price as ever and I could have sold a hundred thousand cases more if I had had the goods under my brand." I said, "How do you do it?" He said, "I have a market in Europe, Asia, Africa, and the United States, and I have taught my market that everything under my brand can be bought without opening a can and the customers will be satisfied." There can be a trade-mark and a brand established for the entire State of California, so that the word "California" upon a package of fruit or a can or a box of dried fruit can be a trade-mark so thoroughly established as a legend representing commercial honor as that every bit of this product going out of California will be taken by the market without examination. When you do that, when you reach that high plane, you have done, in my judgment, the first thing that is necessary for protection. Reach your market in that shape. Let production stand where it is, without further expansion. Wait until that market so reached is absorbing all you send to it, and then you can begin to talk about enlarging. Then you can begin to encourage the stranger to plant trees and vines, and not until then.

So, as I say, the State Board of Trade is showing that we import into California every year five million dollars' worth of dairy products, and we are saying to the people, "Plant alfalfa and get cows, milk them to

get the cream and feed the hogs skim-milk." Let us turn the attention of the stranger to other things than fruit. It is conceded by the world, we have established it, that there is no equal area on the surface of the globe that can produce in perfection as many varieties of the fruit tree and vine as can California. We have talked that universally, now let us send that product to the world in such condition that it will learn to depend upon us entirely for its supply of that form of food, and meantime devote our attention to the other things that are profitable in filling the gap of five millions a year in dairy products and other millions in pork products and that will yield a profit. Let us expand in that form and then it is very easy, when our fruit market has reached the limit of our supply, to begin to expand the supply.

Now, this is a very discursive discussion. I envy a man who can write a paper and stand up and read it. I can't and never could, and the result is I never became a writer and never became a speaker. But bear in mind what I have said to you about the schools. I remember the joy that came into my heart when my only boy, a college boy with an opportunity to train for a profession, was visiting my ranches and tramping over my land and seeing seed time and harvest, had born in his heart an irrepressible ambition to become a land man and a live stock man, and when he left college at the close of his training in elementary law and took up land and live stock I was the happiest father in California. [Applause.] And so, let me tell you. Take this home with you and don't forget it, that every father and mother in California, both in city and country who finds the mind and the taste of the boy turned toward the country and toward land and toward the rural occupation should be as happy as I, because Washington told the truth when he said agriculture is the most useful, the most noble, and the most healthful occupation of man. (Applause.)

PRESIDENT JEFFREY. Mr. McAdie, of the Weather Bureau, is here and he will speak, and you will be pleased to hear him. His subject is "Protection from Injury by Frost." (Applause.)

PROTECTION FROM INJURY BY FROST.

By Prof. A. G. McAdie of San Francisco.

In our attempts to prevent damage by frost in California the first question to be answered is, What is needed? A cheap (the meaning of this word to be given later), easily handled, effective means of preventing rapid cooling during the night and early morning hours. Also, we must prevent excessive drying of the plant tissue previous to the fall in temperature and excessive warming of the dried, chilled plant after the frost. Briefly, we must shield fruit and leaf from abnormal strains, caused by rapid changes in temperature and humidity. In nearly all the papers heretofore written on "Protection from Frost," attention has been given to temperature changes, but very little has been said about the condition which so frequently precedes frost; namely, the drying. In California our frost periods are nearly always preceded by a day or two of boisterous north winds, quieting down at nightfall. These winds, we have good reason for believing, rob vegetation of much of the natural moisture and probably leave

plants in no proper condition to withstand the rapid cooling of the quiet night hours following. The plants are also in no condition to withstand the rapid warming after sunrise, when the sun's rays fall through a dry, clear atmosphere. At such times there is nothing to intercept the sun's heat, practically no atmosphere absorption and no gradual heating, to which the plant might accommodate itself.

Our attention has been drawn to the importance of this drying effect preceding frost by the damage done during the cold spell of December 19-20, 1908. Strong desiccating winds blew down the San Joaquin Valley for several days before the freeze. My belief, expressed popularly, is that the ground was dried out, the trees in large measure overstimulated in the effort to meet the intense evaporation at the leaf surfaces. Then when the excessive metabolism could not be longer maintained there was inadequate exudation, and shriveled plant tissue resulted at a time when it was most necessary that the plant should have a good supply of water to enable it to resist rapid temperature change. Again, it must be plain that such dried, chilled tissue is in no condition to withstand rapid heating. There is some evidence to support these views in the well known fact that frosted oranges, for example, are somewhat dried and do not regain their natural juiciness by remaining on the trees.

If this view be correct, it is plain that in any campaign of frost fighting we must not neglect this antecedent condition of drying and the consequent condition of rapid thawing.

The general campaign of frost fighting, as thus far laid out, covers three main lines:

1. Accurate advance information of the occurrence of frost.
2. Applying preventive measures during critical hours.
3. Preventing sudden warming of chilled fruit, or a too rapid thawing out.

Under the first of these heads great progress has been made in the past five years. Not only in California, but now throughout the various fruit sections of the United States, Weather Bureau officials recognize the value of special study of types of frost maps. The work first undertaken in California on a large scale, and for a distinct purpose, is now an important feature of the forecaster's work at a large number of places. Frosts are found to occur as a consequence of certain movements of low and high pressure areas and the displacement of the lower air incident to the pressure changes. Frost is a matter of *air drainage*, both on a large scale and on a small scale. In other words, frosts are successfully forecast because we understand the general movements of the lower air and in particular certain local circulations. Types of frost maps, that is, conditions preceding frost twenty-four hours, are shown herewith.

The forecaster anticipates a condition in which the lower air strata are quiet, dust-free, and very dry. Under such condition there is rapid radiation and loss of heat from plant and ground and a sharp fall in temperature. While the forecaster gives the general conditions favorable for frost, it must be clearly understood that each individual orchardist must study his own problem of air movement in his own locality. These local circulations should be studied in connection with the daily weather map. It is also advisable to have certain instru-

mental records, such as are given by the thermograph and hygrograph, the importance of which data will be apparent from the discussion further on.

Under the second head, we must discuss some of the physical processes operative in the formation of frost and then mention the various devices, such as smudging outfits, coal baskets, oil pots, orchard heaters, anti-frost covers, etc. Opinions will differ as to the relative efficiency of various devices, and some are undoubtedly more serviceable for certain localities than others. We propose to discuss the principles rather than individual devices.

There are three general principles used in frost-protection devices:

1. Adding heat.
2. Saving heat.
3. Mixing, or stirring the air to prevent cool areas.

Under the first are included all the various forms of heating devices, such as open fires, smudge fires, coal baskets, oil pots, orchard heaters, etc. The use of fires probably dates back beyond our memory, but the first use of the coal baskets for the specific purpose of preventing loss by frost was by Edward Copely at Riverside, Cal., about 1896. The first use of oil that we have a record of was by Everett at Arlington, Cal., and the first use of hot water was by Meacham at Riverside. A severe frost about the end of December, 1905, caused great damage to the orange crop in the Riverside section, and the following year may be said to have marked the beginning of the frost fighting campaign. The Riverside Horticultural Club took an active interest in the problem, and many experiments were conducted by such men as those already mentioned and Koethen, Reed, Holmes, Hall,* Hammond, and McAdie. The work has gone on and there are now on the market many forms of heating devices. A convenient and serviceable frost alarm thermometer and oil pot were devised by the Weather Bureau official at Fresno, Cal., Mr. J. P. Bolton, for use in the vineyards during the spring frosts. There have recently been put upon the market orchard heaters, burning oil, and the claim is made that in the apple sections of Colorado and other Rocky Mountain states results have been most satisfactory. These are known as the Troutman Orchard Heaters, burning oil, and used variously, forty to a hundred to the acre.

Direct heating by large open fires is not recommended, as experience has shown that the heat is radiated largely upward and is not effective in warming the fruit. I may illustrate this by the following experience of one of the most intelligent horticulturists in California. Mr. J. S. Douglass of San Emigdio Ranch writes that during the night of December 20 and 21, 1908, the temperature for fourteen hours ranged between 19° to 24° F. For thirty-six hours the temperature did not rise about 28° F. About fifteen cords of wood and forty tons of wet hay were burned in the effort to protect the orchard. The relative humidity was low, there was little air movement, and the smoke rose as straight as a pine tree. At the intersection of two roads in the orchard there was a large fire and thirty feet away a thermometer was placed on an olive tree. A second fire was burning twenty feet away from this tree in another direction, and a third fire twenty-five feet away in still another direction. The temperature at the tree, however,

*And others whose names I can not now recall.

remained at about 20° F. from 3 to 8 a. m. December 21st. This was the coldest weather in this locality since 1888. It is evident that in this case a large amount of heat was lost.

Many small fires are much more effective than a few large fires. In the use of numerous small heating devices, it is possible to distribute the heat where it is most needed. It is also possible by increasing the number of wire baskets, oil pots or orchard heaters to offset a continuing fall in temperature. It should, however, be stated that with most oil pots, unless the combustion is excellent, there is a deposit of soot which may settle on the fruit.

Under the second head, that of saving heat, we have all the various smudging devices for artificial cloud making and all the different forms of covering. The object, of course, is to utilize the earth's heat as much as possible by entrapping it. Any cover spread above the ground interferes with loss by radiation; and the most effective protective methods have rightly been based upon this saving and storage of heat. To be thoroughly effective, however, the cover should be spread before the earth has lost most of its heat. This is the fault of most smudging efforts; namely, that they are begun too late. The cover, or shield, has another advantage in that it serves after sunrise as a guard against the too rapid warming of the chilled plant after sunrise. We have examined many orchards in California and found that fruit was most damaged where exposed to the direct rays of the sun. While it is not definitely known what action causes the death of the cell, whether it be a rupture of the cell walls or a separation of the water and absence of the necessary turgidity, it would seem that we could not err in guarding the plant fiber from strain due to rapid and unequal heating while still chilled.

Of the various forms of cover devices, the lattice work is probably the most expensive; but certainly the most effective.

A new form of cover, known as an anti-frost cover, was devised last year in the San Francisco Weather Bureau office. It is, however, better suited for the protection of small fruit, garden flowers, and vegetables. It is an old and widely known practice to cover garden flowers with newspapers when frost is expected. In the new anti-frost cover there is used instead of a single cover a double layer of prepared paper with an intervening air space. This prevents almost perfectly the escape of the long heat waves from the ground. Such covering can be spread above the plant an hour or two before sunset, *i. e.*, before the ground has lost much of its heat. If at the same time shallow pans of warm water are placed under the cover, an effective screen and serviceable supply of water are provided. It is also to be noted that we use this cover at a time when the roots are absorbing vigorously and transpiration by the leaves is at a maximum. We, therefore, prevent any lowering of temperature at the leaf surface and store up in the plant a quantity of heat energy for expenditure slowly through the night hours. The actual temperature of the air is of less importance than the temperature of the leaf or fruit surface. A deposit of moisture is advantageous.

A special use of the anti-frost cover in connection with tree fruits is to unroll the covers in the orchard before sunset and to roll them up about 4 o'clock in the morning.

Under the third head, methods based upon mixing or stirring the air, no special devices that are available and practicable are known. When nature mixes the air, *i. e.*, on windy nights, frost does not occur. It is now known to meteorologists that layers of air of different temperature may lie close to one another without mixing. On nearly every frosty night there is a difference of 6, 8 or 10 degrees in temperature between the ground and the air ten feet above, the warmer layers being above. Where air is well mixed and there is good ventilation, we seldom find frost.

Finally, in our opinion the ideal frost protection method will be a combination of a cover, a heater and a ventilator, and if the views advanced at the beginning of this paper are correct, as to injury caused by desiccation, it will also be necessary to provide for water in proper quantity.

To sum up, the fruit grower should:

1. Watch the weather forecast closely.
2. Study local air circulation.
3. Use a thermograph in the orchard and study the temperature record.
4. Experiment and determine for his particular crop the most suitable heater, cover or watering device.
5. Do not give up the fight against frost, because of a first failure.

PRESIDENT JEFFREY. We will now have the pleasure of hearing from Mr. Arthur R. Briggs, the President of the State Board of Trade, upon the subject of "Sulphuring Fruit."

SULPHURING FRUIT.

By Arthur R. Briggs of San Francisco.

Mr. Chairman, Members of the Fruit Growers' Convention, Ladies and Gentlemen: It is always a bad plan for one to make excuses, but private matters have been thrown upon me during the last month to such an extent that I found it necessary to digress somewhat from the program that the Chairman had made out, namely, I was set down for a paper on the sulphur question, and that paper is in my mind rather than in my hand. If I was as good a talker as Colonel Irish, who has just preceded me, I pledge you I would not work for a living. Fortunately for me this morning, he has paved the way for me by telling of the great industry which you are considering, its importance to the State, and what should be done with it. He has left for me merely the prosaic portion of the work—that is, to tell something of the history of the sulphur question and its present status.

You are doubtless all aware that the Federal Pure Food law was passed in June, 1907. You are also aware what consternation was felt in California among the fruit growers when the first decision, known as the food inspection decision No. 76, was issued by the federal department. That order was issued by a commission constituted by the law itself, which commission was composed of three cabinet officers, namely, the Secretary of Agriculture, the Secretary of Commerce and Labor, and the Secretary of the Treasury. Two of these officers knew nothing of the fruit business, knew nothing of the effect the order

issued would have upon that business, and, therefore, the responsibility fell upon Secretary Wilson, the chief of the Agricultural Department. When that order was issued which prevented the sale and distribution of fruit products that carried a larger per cent of sulphur dioxid—the residue after sulphur is used in curing fruit—of 350 milograms per kilogram, or thirty-five thousandths of one per cent, it was immediately discovered that so small a portion of sulphur dioxid was less than that found in any of the cured fruit as it went to the market. About that time, at the instance of fruit growers and fruit distributors, a convention was called at the California State Board of Trade in San Francisco to consider the question and to devise a method of relief, if such relief was obtainable. That convention went carefully into a discussion of the merits of the case and resolved, after a day's discussion, that the proper way to handle the matter was to select or appoint an executive committee to take the matter in charge, and who should have power to do what they deemed to be the proper thing under the circumstances. I was made the chairman of that executive committee, not with the expectation of becoming an important factor in the work, but in order that there might be a central point from which this executive committee could work. My expectations were not quite fulfilled. I was immediately appointed a committee of one to proceed to Washington, take up the matter with the Agricultural Department there, and see what could be done toward a modification of this ruling of the department, No. 76. I was accompanied by a Mr. Brailsford, who was appointed by the Chamber of Commerce or Board of Trade of Kings County, they bearing his expense. We proceeded to Washington, waited upon the Secretary of Agriculture, who at first was not very much inclined to heed the suggestions we made. But I want to say to his credit that at the third interview we had with him and with the Solicitor of the Department of Agriculture, we procured from the department a modification of order 76, exactly in the nature and terms which we asked for. We were able to convince Secretary Wilson that this great fruit interest of California, which the people of this State have for years—a quarter of a century—labored to build up, was menaced to such an extent that in many respects it will be paralyzed if order 76 prevailed. Later—only a very short time later—through and by a letter which I prepared and forwarded to Senator Perkins—the dean of the delegation from this State in Washington—an application was made to the Secretary of Agriculture, a copy of which was sent to President Roosevelt, in which letter the whole matter was presented in a way that seemed to carry conviction to both those officers. President Roosevelt, with his usual earnestness and prompt action, determined that something more than was being done in the Agricultural Department or than could be done through the Bureau of Chemistry of that department, was necessary, and immediately created a commission known as the Referee Board. That board is composed of five as expert scientific chemists as there are in the United States, and after this board was created the whole matter of the use of sulphur and of benzoate of soda was referred to them, and on the action of that board would rest the determination of our industry here. The appointment of this board excited somewhat the opposition—I might say the enmity—of Dr. Wiley, the chief of the Bureau

of Chemistry of the Department of Agriculture. He declared in his contention that the use of benzoate of soda in the curing of such products as peas, cherries, tomato catsup and others, was absolutely wrong; that the products manufactured by the use of it were poisonous, and that it lay in his power to prohibit it. He likewise declared that the use of sulphur in the curing of fruits in this State was not necessary, that fruit so cured was not wholesome, and its use should be prohibited and *was* prohibited by the ruling or decision No. 76. No argument, no appeal, seemed to reach Dr. Wiley. He had taken his position and openly and persistently declared that it was the fight of his life and he would maintain that position. I therefore abandoned further effort with Dr. Wiley and immediately placed myself in position to confer with the Referee Board, and learn from them the policy which was to be pursued. I returned to California confident that the fruit interest of the State was not to suffer, at least, for a period of twelve months. I took occasion to issue a bulletin immediately on my return to assure fruit producers, fruit dryers and distributors of their freedom from any action on the part of the Federal Government so far as the crop for 1908 was concerned. I have the pleasure of knowing that Secretary Wilson, who gave this assurance, kept his word fully and that no interference was had on the part of the government in the distribution or curing of these foods.

When the matter which I have referred to was passed first to the Referee Board it was decided by them that the use of benzoate of soda—being thought to be of the greatest danger—would be first to be considered by them. The five laboratories represented by these scientific and eminent men were, therefore, put to use at once, separately, so that each might make his own examination and determination without reference to the others; for six months these examinations were carried forward by the members of this Referee Board.

You will understand that some anxiety has been felt on the part of all of us and particularly by those who have been closely identified with this movement since the beginning.

When the Referee Board visited California in the early part of the curing season of 1909 it was not known that the finding had been made with reference to the use of benzoate of soda, but it was supposed when the report was made it would be published as a whole and the recommendations of the board would be made on the full finding. But when the board was here it was disclosed that the examination and determination had been made with reference to benzoate of soda and that report was adverse to the position taken and held by Dr. Wiley. Dr. Wiley, knowing this, took every method known to him to circumvent and to discredit the Referee Board, so that its report would not have the effect it was thought it would have. At the National Food and Dairy Congress, held in Marquette, Michigan, late in 1908, a bill was prepared and introduced to the congress there and forced through, which it was sought to have passed by the legislature of every state in the Union, and that bill was of such nature and character and kind as to practically prohibit the use of these chemicals in the curing of our goods. It was necessary, therefore, to circumvent Dr. Wiley somewhat in this regard, and the matter was taken up, after procuring a copy of the

bill which he proposed and had sent to many of the legislatures of the states, and the request was made of them to withhold action until the Referee Board, to which this matter had been assigned, made its report and recommendation. The legislatures of the different states paid the compliment of declining to do anything with Dr. Wiley's bill which he said was so necessary, and it did not pass in a single state in the Union.

The next annual meeting of the National Food and Dairy Congress was called at Denver, in September last. The Referee Board was invited to be present, not to make its report to that body, because it had no right to do it; its report was to be made to the Federal Government and to the authority that had created the board, but the purpose was, as discovered later, to assail not only the integrity of the members of that board, but their efficiency, and thereby to discredit whatever they did and to create an impression that Dr. Wiley was right. I confess that I wanted to be, and sought to be, a member of that congress. I carried from California an appointment from Governor Gillett, the Governor of this State, an appointment from the State Dairy Bureau of the State, and an appointment from the California State Board of Trade, three appointments from three central authorities, with the thought that if there was any effort on the part of that congress to disqualify me, my credentials would be of such character as would make it impossible. I found that I was somewhat mistaken. It was not a question of courtesy to our Governor nor to these other bodies, it was not a question of right—it was a question of a determination on the part of one man to dominate the congress and to carry the point which he intended to make. With me went Professor Jaffa of the University of California, but he, having been appointed by the authorities under the Government, was seated and had his vote in the congress. Mr. H. P. Dimond, who accompanied me, carried only the appointment from the Governor. Mr. Dimond and myself fought for one day and one half, in season and out of season, before our credentials were admitted and we were given our proper place on the floor. The purpose of all this is, and I am telling it to show that the conclusion I have reached will before I finish perhaps seem justified: In that congress, each state having three votes, the vote on all critical points without the vote of California, stood 44 to 44, 88 votes being the full number of votes in the congress. If the delegates from California could be disqualified, Dr. Wiley could carry his point. But after we were seated as delegates the vote on all critical questions stood 47 to 44. I tell this to show how nearly we came to losing the point we were trying to make, viz., to support the action of the Referee Board, in whom we had confidence. I said on the floor of that congress that it mattered not what the finding of the Referee Board was, the people of the State of California and the fruit growers of California had expressed their confidence in the ability of those gentlemen, in their efficiency and in their honesty, and whatever the finding might be we would abide by it and adjust the business of fruit curing, fruit raising, and fruit distribution in California to that finding. That was not what Dr. Wiley wanted; he wanted we should stand with him to discredit the board. And I want to say right now that while I have been in conventions for forty years, or nearly, I have never seen so gross an

assault made on gentlemen representing a board of standing, as these gentlemen stood, as was made against them in that congress. Secretary Wilson, with some of his staff, including the solicitor of the department, were present during this conference, and Secretary Wilson said to me, when I had become successful in getting my credentials acknowledged, that he had never seen such gross methods resorted to as he had seen in that congress. This is, of course, a matter of history.

I now come to the point of the present status of the sulphur question. It is in the hands of this Referee Board, but I feel the greatest confidence that the finding of that board and its recommendations to the department will be in favor of sustaining the contention, that the use of sulphur in the curing of fruits is harmless. In the case of benzoate of soda, it was decided by the board that not only the quantity which has been in common use was harmless, but that it was a harmless product in much greater quantity. In other words, it was declared that there was no danger in the use of benzoate of soda in curing of fruit and meat products as now employed, and they recommended that it be continued. Instead of fixing a unit of thirty-five one-thousandths of one per cent of sulphur dioxid, as was fixed under decision 76, I am assured by the members of the Referee Board individually that there is no apparent injurious effect from sulphur dioxid on the human system and that a larger quantity than thirty-five one-thousandths of one per cent will probably be permissible. I am not saying this for publication. I say it on my own responsibility, but to assure the fruit growers of California that they are in pretty safe hands and need give themselves no immediate alarm.

I want to say further that I am given to understand by the Referee Board that whatever their finding may be, it will not be made until about the middle of the year 1910, and if it is adverse to our interests that no hasty action will be taken; that it will not be made operative during the curing and marketing and distribution of the fruit products of this State grown and cured in 1910. Therefore, you have a year before you any way, and if the finding is not altogether to our satisfaction, I feel justified in saying that a unit of sulphur dioxid will be fixed that will enable us to go on as we have done heretofore without danger of interference on the part of the Federal Government.

I presume, Mr. Chairman and ladies and gentlemen, I would act the part of discretion if I stopped here, but I am so impressed with the determination of Dr. Wiley to carry his point, even to the destruction of our interest in California, that I do not hesitate to place myself on record as to what I think should be done with that officer. He is appointed by the President of the United States. He holds his position in the Agricultural Department under this appointment and is answerable really to no one except the National Food Inspection Commission and to the President of the United States. While Honorable James Wilson, the Secretary of Agriculture, is our friend and is ready to do, I believe, anything within reason to protect us and help us, he is powerless to control Dr. Wiley, the chief of the Bureau of Chemistry, or to remove him in the case of his not doing as he desires. Therefore, I say in our own interest, I deem it to be a proper and right thing to create, so far as we can consistently, a sentiment against Dr. Wiley, under the impression that any man as vindictive as he is, as determined

to work against us whether right or wrong, should not occupy a Federal position as important as this. The difficulty of his removal is this: No man is all good and no man is all bad. No one is willing to declare that Dr. Wiley is not a chemist, but that he is a pathological chemist I deny. He was educated a physician, but has never practiced medicine a day in his life, so far as I am able to learn; therefore, he can not speak as a pathological chemist, though he can speak unquestionably as a chemist *per se*. It goes, therefore, without saying that Dr. Wiley is useful in some branches of the work which has been assigned to him, and unless we can show that there is real necessity, a public demand from the fruit growers of this State and from other states likewise interested, for the removal of Dr. Wiley, I fear he will remain in his present position and go on fighting without limit, to our detriment. He has it in mind now, and that mind has been made known to me, to again introduce a bill into the different legislatures of the respective states. I have seen a draft of that bill; I know its conditions. I know it was introduced at the congress in Denver in September, but having 47 votes against and 44 in favor, they did not dare make the motion that it be approved by the congress and it fell dead. But that effort is going to be revived just as sure as the sun rises and sets, and the work that has been done will be futile unless we continue like efforts to those of the last two years, to circumvent any action of his in reference to the introduction of these bills. It makes no difference what the federal law may be. We are all in favor of a pure food law. Every intelligent man and woman in California is in favor of a pure food law. But if the different states pass laws of their own, as they have a right to do, and make them so binding that we can not introduce our goods and dispose of them in those states, the federal law will not help us; the state statute will control, so far as the state's distribution is concerned. You may think that I am somewhat persistent. I deny that I am vindictive, but I am so interested in California, I am so interested in the people of California, I am so interested in the industries of California, that it makes no difference who the man is, high or low, when I find he is working against these interests I am against him and persistently so, and therefore I say, whether Dr. Wiley likes me or not, that I am not his friend, I never expect to be. I believe that it would be a wise thing for conventions like this to place themselves on record by resolution, supporting the Referee Board and declaring it to be their intention to stand by the finding of that board, whatever it may be. I thank you. (Applause.)

A recess was here taken until 1.30 o'clock P. M.

AFTERNOON SESSION.

PRESIDENT JEFFREY. The meeting will please come to order. As you know, the excursion should have been this afternoon, but as that has been called off the time is yours. How will you use the two hours here that we have this afternoon?

MR. JUDD. Mr. Chairman, I move that the President, Mr. Jeffrey, arrange the program to suit himself. He is in touch with everything that is coming up, and I believe he is more qualified than any one on the floor to make a program.

The motion of Mr. Judd was seconded and being put by him, was unanimously carried.

PRESIDENT JEFFREY. Mr. Newcomb has something he would like to present.

Mr. Newcomb read a telegram from Santa Rosa extending an invitation to hold the next convention at that place, and spoke in favor of meeting there, as did also Mr. Galloway.

Mr. Costello and Mr. Dargitz made a few remarks on behalf of Lodi, which also extended an invitation to the convention to meet at that place.

MR. NEWCOMB. I would like to say just one more word on this line of fruit growers' conventions, about going to the sections that need us. You have started in on a plan that I think is good, and that is, going to each section and specializing on what they need. This is a general body of the whole State. We can not, at any place, discuss the problems that are just needful for that point. My idea really of this thing would be that the State office hold meetings in these different places, as they have started to do, and then every year this meeting should be held at Sacramento where the State office is and where the insectary is; take the small meetings around and give exactly what those people need, but have the main meeting every year at Sacramento.

PRESIDENT JEFFREY. I will say to the claimants of this meeting, in line with Mr. Newcomb's suggestion, there will be a meeting at Lodi, already provided for. Arrangements are being made for holding a meeting in Sonoma, presumably soon. These meetings that we have held in Solano County and Placer County are larger than our general fruit growers' conventions, though not so general in scope. It may be that Mr. Newcomb's suggestion is good, but Mr. Stephens will tell you that the people of Sacramento don't care very much about having conventions there, Sacramento being a large commercial city, and a very prosperous one; they are so engaged in commercial pursuits they do not encourage the State Fruit Growers' Convention as they should. Of course, we held it there last year and they assisted us all they could. Sacramento is really the place where these conventions ought to be held, and so long as we are going to hold neighborhood meetings anyhow, it will not make so much difference to you. We are going to have one in Santa Rosa and one in Lodi, and they have been promised all over the State in fact, and we will get to them before your next crop comes in. They will be business conventions. We will not consider

cultural topics or scientific topics but we will talk business. The Newcastle meeting passed a resolution inviting the next convention to be held there, but as we have had two big meetings there and have to hold still another, it probably would not be wise to have the convention there.

MR. KELLOGG. Newcastle is not pressing that point.

PRESIDENT JEFFREY. The reason these matters are not settled one year in advance by the delegates themselves is that sometimes new matters come up during the year, and it is only a matter of selecting the location. Now, I would like to hear from Mr. Frank Femmons, one of our most honored members, and he would like to say a few words of appreciation to this convention.

MR. FEMMONS. *Mr. Chairman and Fruit Growers of California, Ladies and Gentlemen:* I was disappointed a year ago in not meeting you at Sacramento, and at this late date I have requested of our Chairman, the honorable Commissioner, the privilege of thanking you, the California fruit growers, with Professor Wickson, whom I met personally the other evening, for a resolution that the professor presented before that convention a year ago, and with the sentiments that were expressed at that time, of respect, of loving regard and of appreciation of the life work of Alexander Craw. I come to you to thank you sincerely from the bottom of my heart for that loving kindness that you showed to one of the noblest men that has ever lived in this Western country. For thirty odd years I have known him and loved him as a brother. I was with him in his last days and his last hours, and my own hands and those of a sister were the last hands that arranged some flowers about his cold but peaceful face. And oh, the sadness of that hour! I wish to bring those memories up in your hearts and to renew them in my own, and perhaps I can do no better, as he passed away from us up in the mountains of the Sierras near the Yosemite Valley, than to try, in as few words as I can, to express something of a picture of the last work that Alexander tried to do with his own hands. Perhaps some of his old associates, his old friends that I know he almost worshiped in his very soul, would carry that picture. It was a simple little one and I shall certainly carry it in my own heart as long as I live.

It was Sunday morning, the last Sunday of his life. The June sun was shining bright and pleasant. The birds were singing in the oaks and pines about the grounds. The forest hills were surrounding us, and up above, on the crest of the mountain, the pines and the firs stood against the sky. We were trying to arrange the flowers, do a little pruning here, fixing a little there, though for my own part I was trying to keep him as much as possible from any exertion that I could, but he was all animation, the same old Alexander Craw that many of you have known for thirty years or more. There was no indication of wavering of thought; he was happy, contented and as hopeful as any of you ever saw him in his life. His brother James, who was with us at the time, but who since has also passed away, came and asked us in a joking way if we knew what day it was. I saw that Alexander was confused. He could not change his thoughts for the moment from his pleasures and find some answer to that question. To help him out a little, I asked, "Is it any harm to help God take care of his beautiful

things?" "No," says he, and, placing his hand upon my shoulder, "Let's go ahead." Full of life, energy, absorbed right there among the flowers and the roses, he was right in his element and his old self again. But I soon saw that he was getting weary and I led him to a seat on the porch, and he soon lapsed into a kind of a half dreamy melancholy that was such a pain to us. That was the last effort Alexander Craw made to do something with his own hands, and I leave it to you, just an outline as I have tried to paint it, and I thank you for your attention. (Applause.)

PRESIDENT JEFFREY. I think all will recognize how fitting this little tribute to our beloved friend. Away back before any of us, almost, began attending conventions, you will see the name of Alexander Craw in the published reports, always to some effect, always to some benefit for the people of the State, always hopeful for good, and there those records stand for years and years, and now it is certainly befitting for us to make a record of the words of his brother-in-law at this time. We thank Mr. Femmons for this tribute. Mr. Rixford wishes to make an announcement.

MR. RIXFORD. Last spring, in distributing the caprifigs from Loomis, Wells, Fargo & Co. refused to give us the fruit rate. The agent there ruled that as these figs were shipped principally on account of the value of the bugs they were not entitled to the fruit rate. I said, "Are they not fruit?" "Well, yes." But, at any rate, they charged to the central part of the San Joaquin Valley, where most of the figs were shipped, from 70 to 75 cents a box. Taking up the matter recently with the head men in San Francisco, I have finally got them to agree to give us the fruit rate, so that the express charges will be only about one half what they were last season. I thought I had better announce it, because some of you may want those figs.

MR. BRIGGS. I would like to know if I would be out of order in the introduction of a resolution to be incorporated in the report of the Committee on Resolutions.

MR. KELLOGG. Mr. Briggs was requested by the committee to formulate a resolution. It was suggested that he read it to the convention and make his own comments on it.

Mr. Briggs read the following resolution:

Recognizing the great importance of the fruit interest in the development and continual growth of the State, and believing that any material change in present methods for curing and preparing dried fruit for distribution, and further believing in the harmlessness of sulphur as heretofore and now employed in the process of drying fruit, the State Fruit Growers' Convention here assembled in the city of Watsonville—

Resolved, That we commend the action of our late President, Theodore Roosevelt, in taking from the hands of the Department of Agriculture the matter of investigating and determining the wholesomeness of fruit cured by the use of sulphur and of placing the whole matter in the hands of the Referee Board, created by him for determination; and

Resolved, That by these resolutions we express our appreciation of the efforts of Mr. James Wilson, the Secretary of Agriculture, in our behalf, and commend his intelligent consideration of the fruit industry of California; and

Resolved, That we have faith in the wisdom and integrity of the Referee Board, and are satisfied its findings will be fair and right and founded on scientific knowledge and efficient investigation and experiment; and

Resolved, That the attitude of Dr. H. W. Wiley, Chief of the Bureau of Chemistry, in what is known as the sulphur question is in our judgment unwarranted and not consistent with the position he holds as a federal officer, and that we hereby record our disapproval of his course.

On motion of Mr. Judd, duly seconded, the resolution was adopted.

PRESIDENT JEFFREY. Now, I want our Committee on Resolutions to write out a strong endorsement of Mr. Briggs' entire course. My personal feelings are that you can't make these resolutions too strong in favor of what Mr. Briggs has done.

MR. DARGITZ. The committee that was appointed yesterday on the matter of providing for the expenses of printing of these reports on transportation is ready to report. We have heard about the benefits of coöperation in many ways. Sometimes we have an opportunity to demonstrate the practicability of it. We can have very little of the benefit from coöperation except we first have organization. I think we have evidence that the fruit growers of California have all benefited to a great degree from organization, and in order to demonstrate the practicability of that statement I am now going to make this announcement, that the expense of some three or four hundred dollars for the printing of that, I am authorized by a representative of the California Fruit Exchange and a representative of the California Fruit Distributors, to say that the expenses will be prorated between these two organizations in behalf of the growers of the State. (Applause.)

MR. BRIGGS. Mr. Chairman, I desire to express my appreciation of my courteous treatment by the convention, and to say that I regret very much that I must go, but I am a servant of the people of the State and bid to go here and there, and I am going this afternoon to attend a meeting in another county. (Applause.)

MR. KELLOGG. The Committee on Resolutions is ready to make a partial report.

RESOLUTION OF THANKS TO GOVERNOR GILLETT AND LIEUTENANT GOVERNOR PORTER.

Resolved, That this convention does hereby express its heartfelt appreciation for the presence and inspiration received from Governor James N. Gillett and Lieutenant Governor Warren Porter at the opening sessions. We thank them for their manifest interest and words of encouragement.

RESOLUTION APPROVING HORTICULTURAL COMMISSION.

Resolved, That we heartily approve of the administration of J. W. Jeffrey and his efficient secretary, O. E. Bremner, of our State Horticultural Commission, and commend the wisdom displayed in holding conventions of growers and shippers in important fruit districts over the State; harmonizing the different interests; standardizing the packing and marking of the fruit for interstate shipments; and setting in force methods for the extermination of fruit pests; and recommend that similar methods be pursued until our fruit industry has attained the high position to which it is entitled.

PRESIDENT JEFFREY. I thank you. I would like to say one word in regard to that resolution. These meetings will be held in accordance with the spirit of that resolution to the fullest extent of the power and strength of the office. We have promised one in El Dorado County, and, as I said this morning, two or three other places, and one in San Bernardino County and another in Porterville and another in Kings County, and we will hold all that we can through the winter and spring and as far as the money and the strength of the office will go. We have various other duties, but we expect to keep these up, and I thank you for the appreciation.

RESOLUTION REGARDING KEEPING RECORDS.

Whereas, It is quite evident that in future our orchards must be bred up to produce fancy fruit and to do this we must get rid of scrub trees; therefore, be it

Resolved, That we each begin keeping a record of the production as to quality and quantity of fruit, behavior of tree, time of blooming and ripening of fruit, on any tree in our orchards that seems exceptionally valuable; and after five years' proving of continuous value and fixed qualities, these trees and records be offered to nurserymen for propagation as pedigreed fruit; and be it further

Resolved, That we encourage our nurseries to propagate only the best and most vigorous stock by refusing to buy "seconds" or inferior stock at any price.

RESOLUTION REGARDING STANDARDIZATION.

Resolved, That the fruit industry of California has reached a point which demands a standardizing of all deciduous fruit packs, prepared for interstate shipments. Placer, Solano, and possibly other counties have or will adopt standards for their districts, which we heartily commend. We recommend that all sections of the State unite, so far as practicable, in having the standard of the varieties of fruit uniform, the markings designating the quality the same, and that all fruit shipped be packed in standard dimension boxes only.

RESOLUTION ON OVERPRODUCTION OF FRUIT.

Whereas, Several varieties of fruits and grapes seem to be near or actually suffering from overproduction or underconsumption; and

Whereas, The great and growing demand for the Smyrna figs is so far ahead of the supply and the product so excellent; and

Whereas, The profitable areas for almond production are so limited and the demand so great and not likely ever to be exceeded; therefore, be it

Resolved, That we earnestly recommend the planting and propagation of these two excellent fruits, also Bartlett pears, wherever the conditions are suitable and they have been proven out.

PRESIDENT JEFFREY. Would the committee have any objection to putting Bartlett pears in there? There is one county in the Sacramento Valley where they are trying to eradicate the pear blight so they can begin planting again.

MR. KELLOGG. We have no objection to including that.

PRESIDENT JEFFREY. One of these meetings which you recommend was held in Sutter County, and they took this matter up and discussed it thoroughly, the fact that they were trying to eliminate the pear blight in that entire county and give the orchardists a chance to plant Bartlett pears, and by passing these resolutions, especially when there isn't a nurseryman on this committee, it is really a beneficial act for this convention to express its ideas on what particular lines of fruit culture should be extended and what should be curtailed.

MR. JUDD. I move the adoption of the resolution as amended.

The motion was duly seconded.

MR. STEPHENS. I, for one, am opposed to the resolution. I am opposed to it from a conscientious standpoint, because we don't know what the outcome of the planting of these varieties will be. Ninety-five per cent of the literature sent out to induce people to come here recommends the planting of certain varieties and there is no one particular variety that has been recommended more strongly than Tokay grapes—peaches and everything you can think of. I, for one, don't propose to take the responsibility to say to any person here or any person in the State, set out Smyrna figs, almonds, pears or anything else, simply because we do not know and we can not look into the future far enough to know what result would come from such recommendation. It might be an inducement for thousands of acres to be set out, not only upon land that would produce those things as they should be and as nature requires, but also upon land that would not be adapted to their growth and their production. Not being able to go out and test the land, the man who would invest his means in there would go upon our recommendation, and he might be the sufferer to a great degree, from a financial standpoint, and possibly his all, from that standpoint. And I do not believe that it is within the province of this convention. I do not believe that we should undertake to advise any man what to do in regard to the varieties of deciduous or other fruits that he should set out. We have had an example, and there are thousands of growers that are absent to-day for the reason that they believe that they can not afford the expense of attending this convention, that

are upon the very verge of ruin because they have followed the advice given in such matters as this. It is well to incorporate in the report, if you will, the papers that have been read here and let the man judge for himself, but don't recommend to him what he shall do in regard to these matters. (Applause.)

MR. WALTON. I indorse Mr. Stephens' remarks from a different standpoint, and that is, that it is not within the province of this convention to give any advice as to what variety of fruit shall be planted in this State. I think when you come to look at it you will see the injustice of it.

MR. HARTRANFT. Mr. Chairman, I was going to indorse exactly what Mr. Stephens said in exactly the same way Mr. Walton has placed it, because I rather felt amazed that the convention should undertake to give advice as to what particular varieties to plant. We have had contests in this convention before regarding advice, pertaining to the planting and other subjects pertaining to the coming of home-seekers which have always been candidly considered and, I think, wisely acted upon, and upon the ground that I should recommend probably later, in other discussions that Mr. Stephens has alluded to, that the convention do not go on record in that particular tone of voice. I don't think we should be either for or against the planting of any particular thing. The records stand. There are those that are self-interested and those that are disinterested, and the man then has his welfare in his own hand, both as to what to plant and what not to plant, and I should be opposed, and always have been and always will be, for the convention to say either for or against any particular thing of that kind.

PRESIDENT JEFFREY. I would like to make one suggestion here as your Chairman. A man has no right to plant any more Tokay grapes under present marketing conditions. A man has no right to do a thing that would injure his neighbor. Now look at it from two standpoints. He has the legal right to do it, and he has been exercising that right with a vengeance. By simply naming the varieties of fruits that this convention thinks ought to be extended, by inference limits the varieties we think should not be planted. I hold that these land schemers in the Sacramento Valley threaten to wreck the fruit business itself, because if there are 10,000 car loads of Tokay grapes going into the markets, it is going to demoralize the market for your peaches and pears, and I claim it is a matter of self-protection for the growers of this convention to speak out on such matters. You are up against a crisis, and men are becoming bankrupt all over the State from listening to the song of the siren, the land boomer. The sheriff is fixing a whole lot of them up there every year, and there will be more of them that have listened to the song of the land seller that has land to sell planted out to grapevines to give it an apparent value as a venture, and the very planting of the grapes has really deteriorated the value of the land. They are trying to shut some of the land boomers in the Sacramento Valley out of the mails by getting a fraud order against them.

MR. HARTRANFT. I have just read this report for the first time. I am happy to report that for once I agree with Mr. Stephens. I move that we consider the two together, and if we take the negative take also the positive.

MR. ASHLEY. I second that motion. I think that quite a number of us would be much better off if this convention had taken up this matter a year or two years ago and put out some information that people could rely upon as to the standing of the Tokay grape, and also as to what the prospects are for fruit that will pay.

MR. STEPHENS. I am in hopes that the suggestion offered by Mr. Hartranft will not be accepted, and I really hope that the gentleman will withdraw the suggestion, because I can see that there will be no other business transacted by this convention this afternoon and perhaps not to-morrow. It is a question of great magnitude and we could not possibly get through with it. Therefore, I think we had better get along just as peaceably as possible until we come to the rock upon which we will probably divide. I think we had better take one question up at a time and consider it. The reason I objected to that is, I don't want to suggest to any man what to do. For many years I have been solicited to make suggestions. My answer has been that I have got no advice to give for the reason that I do not know myself what varieties to put out. I have uprooted trees and had to fill in the vacancies; I didn't know what to do, and in a manner I was groping around in the dark. I would one year put out one variety, switch the next year and put out another, and for five or six years kept on changing every year.

MR. DARGITZ. I am very glad indeed to see the discussion and the interest taken. If we pass a resolution without any discussion the possibility is we will proceed to go home and forget all about it. The idea of the resolution is not to say that any man shall or shall not plant any variety. The question comes to me very forcibly, because some years ago I was looking over the State with a view of selecting a location for fruit growing. It is not so much a question of what we are going to do, but other people are coming to the State with a view of going into fruit growing, and I understand that all these papers that have been read here and these resolutions will be printed and will be placed in the hands of homeseekers who are contemplating going into the fruit business or planting ventures. If we who are here and have experience know that certain varieties of fruits have been planted to such an extent that there is absolutely no profit in them to-day, will we be doing ourselves justice, will we be doing those who contemplate coming in justice, if we keep our mouths shut and let them plant things that are unprofitable even now? It is not a question of changing market, it is not a question of shifting from one fruit to another, as, for instance, peaches and plums. If the market was low on peaches to-day and high on plums we would not suggest that you grub out your peaches and plant plums, for the reason that to-morrow it may be the other way. But knowing that somebody is going to plant anyway—if they did not the nurseries would get in trouble—knowing that there is a very great and increasing demand for the Smyrna fig and at such prices that it is profitable and that it is liable to continue to be profitable for a good many years to come—I will grant that there may be such a thing as overproduction of the Smyrna fig at some time, because there are large areas in the State that are liable to grow it in paying quantities, but for the present the outlook is very good along that line. On the other hand, the question of almond planting. Is it

a selfish proposition for me to recommend the planting of almonds if it is likely to overdo the market? My principal article is almonds, and when I invite you to produce more of them if that results in overproduction, I am inviting trouble for myself, but I think I showed conclusively by my paper yesterday that there is no likelihood in generations to come of overdoing the almond question, if we plant where the varieties have been proven out. The late Senator Langford owned a very large acreage of almond which never paid, and the orchard that I now have. He always referred to the Texas Prolific almond as a mustang, and he called these paper shells thoroughbreds, and the thoroughbreds didn't pay and the mustangs did, and about a year before he died he remarked that if his orchards had only originally been planted to mustangs he would have been a wealthy man.

The question was put by the President on the adoption of the resolution as reported by the committee, and the motion to adopt prevailed.

RESOLUTION COMMENDING PRECOOLING.

Resolved, That all experiments and observations have demonstrated the great importance and substantial benefits of cooling fruit as quickly as possible after it has been picked to arrest decay and preserve the same in a sound and healthy condition. Therefore, this thirty-sixth California Fruit Growers' Convention commend any method that will do this work quickly, thoroughly, and uniformly to the center of the fruit, and believe that best results will be obtained by the method of preserving fruits at initial shipping points, and whenever possible before the fruit is loaded in the car.

RESOLUTION REQUESTING SUPERVISORS TO ACT.

Whereas, Many noxious weeds are appearing as a menace to both orchardists and agriculturists; and

Whereas, Under the present horticultural law the county horticultural commissioner is given the authority to exterminate noxious soil pests as well as fruit pests; therefore, be it

Resolved, That we urgently request the board of supervisors in all counties to speedily establish the commission in their counties, and insist on the extermination of such pests.

PRESIDENT JEFFREY. This is a State-wide question, gentlemen. Mr. Chase, will you speak just one minute on that point?

MR. CHASE. There are so many noxious weeds in the State, in Sacramento County, in Placer County—indeed, all over the State—and I have written letters and I know from the best authority on one particular weed that it is easier to tell where it is not than where it is.

PRESIDENT JEFFREY. Has there been any land abandoned?

MR. CHASE. Yes; there are orchards abandoned in Sacramento County and Placer County and out on the Cosumnes River. There are acres of land for sale. We can't raise a thing. This Johnson grass can be eradicated, without great expense, in three years by the methods adopted by the Bureau of Plant Industry at Washington. There is another noxious weed I find that is producing a great deal of alarm, and that is one of the lippias, not the *Lippia repans*, where it has been used as a sod to make an overflow. It has got all over the Cosumnes River, where the dairy business is the chief business. It is destroying the alfalfa.

PRESIDENT JEFFREY. And you think this is a great question?

MR. CHASE. It is one of the most important questions there is.

MR. KELLOGG. I want to say this, that it was an eye opener when you stated to me yesterday that the Horticultural Commissioner had power over that. For years I have made a practice of sending men clear to town to clear the noxious weeds, but my neighbor would have a fine patch of them.

On motion, the resolution was adopted.

Resolution Approving Work of State University.

Resolved, That we appreciate the work of the State in expert and efficient experiments and effort undertaken by the University of California, and the valuable demonstrations of knowledge and results attained by their efforts.

Resolution Relating to Good Roads.

Resolved, That the fruit interests of the State are greatly affected by the condition of the public highways; every jolt is a menace to its keeping qualities. Our fruit trees and vines are unjustly taxed in addition to the taxes upon the land, a discrimination in favor of all other agricultural pursuits, except the alfalfa growers. We, therefore, feel that it is our special right to demand the best roads possible in all of the horticultural districts.

Resolution as to Persons Selling Land.

Whereas, Unscrupulous and sometimes dishonest persons are throughout the State buying cheap and sometimes worthless lands, cutting the same into small tracts, often so small as to be worthless for the purposes of maintaining a family or any part of one; and

Whereas, Said parties often advertise the same in a laudatory and often false manner, creating impressions that often mislead the unwary; and

Whereas, The Government is engaged in making a soil survey throughout the State for the purpose of defining the character of the soils so surveyed to guide the agriculturist in making the best use of said lands; therefore, be it

Resolved, First: That the fruit growers of the State Convention assembled deprecate the methods often used by the aforesaid parties, and condemn as false many statements made setting forth the possibilities on such lands.

Second: That we ask the Government to publish the soil surveys together with the analysis in bulletin form, so that buyers may fully understand the soils of the intended purchase.

Third: That the legislature be asked to pass such acts as will protect the buyer by compelling the seller to publish the soil analysis and character of the same in accordance with the Government survey.

Fourth: That we here and now call the attention of intending settlers to the fact that our soils and location should be very carefully scrutinized before buying or planting, especially as there are plenty of locations available that are worthy.

MR. CHASE. I want to say just one word on that. That is one of the most important resolutions we have. In my recent investigations in regard to raising oranges and other things and our experience in Fair Oaks, we have planted our trees where they will do no good. Just now there are about to be planted 2,000 acres of land and the owners are going to advertise it as orange land. I have suggested whether some one should not go and ascertain whether that land will grow oranges. The question I wanted to ask was, can that be done at the expense of a county or can the State order that done?

PRESIDENT JEFFREY. No, sir.

MR. CHASE. The State has appropriated $16,000 for the examination of diseases, and I did not know but that they might be allowed to examine land that is going to produce diseases.

PRESIDENT JEFFREY. The disease is in the mind of the Eastern gullible buyer and we can't cure him until he comes out.

MR. CHASE. We have suffered a good deal from planting trees on soil that is not fit for them.

MR. HARTRANFT. I am only sorry for that report in one respect, the indefiniteness of the persons referred to. This condition has existed in California ever since about 1870. Land has been bought and subdivided and the old settler has said it was worthless. Mr. Stephens convinced me five years ago that the State was going to rack and ruin, and I went down home and started a homeseeker's journal. I let some fellows get hold of me and I have been subdividing. I have put out seven large tracts of land. We have our record behind us. I get not less than three hundred letters a month asking if this concern is right, and I have come near going to jail for libel. It would take almost a supreme being to decide what colonies are thoroughly legitimate. I feel that if this convention wants to have a committee pass on the colonization plans of the State it would be one of the best things that could happen, especially with regard to this planting eucalyptus. The Sacramento Valley Development Company has had no reputable newspaper

in California carry their advertising, either on the Tokey proposition or the eucalyptus. I think something definite should be said there. I know you have one paragraph, but taken in connection with the Associated Press dispatches, I don't think the convention has stated it in an intelligent manner. The people have got to be brought here. We have got the valleys in this State that are going to be settled either by Japs or Chinamen or Slavonians or Americans, and while all races are fellow beings we want Americans, and it is a great work, a sacred work, and I think the paragraph, together with the general attitude, just makes us carping critics about what I deem to be the noblest profession next to growing fruits, and I do think that that resolution is a very sweeping proposition, has no allusion to the legitimate work in that line which has been going on and always has got to go on, and I am going to work against it, although I am not a bit opposed to its general tone.

MR. DORE. I am not pleased with the resolution as read. It indicates that the report of these soil experts when published shall be a guide for newcomers. There is hardly a section of land, perhaps hardly 80 acres, that would bear any resemblance throughout the entire tract where the survey was taken. In my own place of 100 acres there are all sorts of soil and many kinds of hardpan within reasonable distance. To take a sample and sell a farm on that sample would not pan out, and I believe the same situation prevails throughout the State. There are tracts in the Sacramento Valley and Kings County where it might average, but generally it will not.

MR. STEPHENS. I heartily endorse what Mr. Dore has said. There are many localities where you go 50 feet and you find altogether a different character of land, and you will find in many instances seven or eight different kinds of soil on a hundred acres, and unless the expert bores into the ground on almost every 50 feet you can't tell what it is, except it be an alluvial deposit, like a river bottom, and in many instances the value of the land for productive purposes varies materially in a short distance. I think the resolutions are all right. We don't want to deal in personalities, but it will be a warning in general. It will have a tendency to put people on the lookout and that they themselves should be the investigators to ascertain whether this or that piece of land offered for sale is worth the price asked. I don't believe, under the circumstances, in citing any particular interest, any particular locality or any particular colonization organization, because, as Mr. Dore says, the lands vary so materially in such a short space. Take the hardpan. It may be within eight inches of the surface here and 50 feet away it may be within ten feet of the surface.

MR. HARTRANFT. I would like that we vote that resolution down and then vote that our Chairman appoint a committee of three or seven men who will bear the brunt of making the good name of California, who will investigate the general publicity schemes that are going on about lands and have in their power to call a meeting, and directing the attention of the postal authorities, without taking the dangers and risk of direct publicity. That will be work.

MR. JUDD. The Government of the United States has agents all over the State of California, and I presume other states, making these soil surveys. In the Pajaro Valley and the surrounding country I think Mr. Mackey worked something like two seasons making those surveys.

The Board of Trade of this town went to quite a bit of expense in having those surveys put in vials or long glass tubes, setting forth the various localities, what it is composed of, where it was taken from and what its value was. It seems to me that as little as this convention could do would be to hold up the hands of the Government in this very thing that we propose in this resolution. If we want to show the people what we have got and we are honest about it, there is nobody going to make any objections. But if you have got any hardpan down west of Fresno, 12 or 14 miles, all covered with alkali, and sell that to people back East until taxes carry them out, that is all right. If you go up near Centerville and find it is a bog during the wet season, you don't want to get a lot of people in there. It would turn out just exactly as Mr. Hoffman's colony did at Merced. We have a man in our county now, a lawyer, that spent something like $35,000 or $40,000 on his own place before he got there. There was something like two hundred families from Holland that sent their money on and had their houses built and they came out here and they got the water on, and the third year they had to pull up every tree; and lots of those people, all they had on earth was sunk in that hardpan spot; and I only know of one man, Mr. A. R. Curry, they crowded him off on to a sandy spot and he put it out to olives and has made good. There isn't anything in the State of California that damages us to-day as much as this grafting proposition on poor land. I am in favor of the resolution as read.

The motion to adopt the resolution was carried.

Resolution Regarding Parcels Post.

Whereas, The California Fruit Growers' Convention has been working for five years to secure for American citizens the advantages of modern civilization in the way of a parcels post; therefore, be it

Resolved, That this convention appoint Edward Berwick of Monterey, John S. Dore of Fresno, and G. B. Messenger of Los Angeles, a committee and authorize these to compile from the Congressional Record the action of every senator and representative from California, upon any phase of the parcels post which may come before Congress, and supply the same to the press of the State.

Resolution as to Committee on Parcels Post.

Whereas, The future prosperity and very existence of California horticulture depends on transportation facilities; and

Whereas, One most valuable transportation agency, the parcels post, which in other lands brings producer and consumer together, is here, by reason of prohibitive rates rendered useless; be it

Resolved, That this convention of California horticulturists assembled at Watsonville this 8th day of December, 1909, hereby requests the senators and congressmen who represent the Pacific coast states at Washington, to pass such measures as shall permit the Postmaster General to grant the American people such parcels post rates as are current in Germany, Great Britain, Japan, and other civilized lands;

Resolved, further, That our Secretary be instructed to send copies of these resolutions to our representatives in congress and also to President Taft and Postmaster General Hitchcock.

Resolution as to Postal Savings Banks.

Whereas, Our monetary system is inadequate to put into general circulation sufficient to meet emergencies arising from the movement of crops, or money stringency caused by financial institutions that have practical control of issue;

Whereas, Other progressive countries have found the system of postal savings banks to cover many of our financial ills; therefore, be it

Resolved, That we, the Fruit Growers' Convention assembled, most earnestly urge congress to pass such laws that will bring about such postal savings banks.

Resolution Endorsing Report on Freight.

Resolved, That the able and exhaustive report of our Committee on Freight Rates shows valuable data and a vast amount of labor performed, we hereby endorse that portion of their claim for a reduction of a freight rate bringing deciduous fruits on a par with the orange rate. We justify their demand for a postage stamp rate of $1.15 per hundred pounds, but later experience and computations with present labor conditions shows us that a rate of $1.15 for the past season would have been too high to encourage any further development in the fruit industry. Therefore, we hereby instruct our Committee on Freight Rates to press the matter through all legitimate channels for a postage stamp rate of $1, thus placing all deciduous fruits on a par with the lemon and apple growers of the coast. This rate only will satisfy the fruit interests and offer encouragement to prospective growers.

MR. STEPHENS. I wish to return the thanks of the Freight Rate Committee to the delegates to this convention for their kindness in endorsing the action of their committee. I will state that for years we have been engaged in our efforts to secure the reduction which will be in your interest and we have not spared either time or expense. Labor has not entered into it in any way. We have, as you see, conducted the correspondence in a manner that has been kept from the public up to this time. We believed, as I stated yesterday, that the reasons were so obvious why the same rate should be given the deciduous fruit shippers that for years have been given the orange shippers, that we would have but little if any trouble in securing that, but we found that we would have trouble. We kept it from the press, we kept it from everybody that would give it publicity, in the hope that at this time or before this time we would receive information from the transportation companies that their request had been granted, and had that request been granted that report would not have been published. In behalf of our committee I thank you, Mr. Chairman, and the delegates, very sincerely.

A recess was here taken until 8 o'clock P. M.

EVENING SESSION.

PRESIDENT JEFFREY. The meeting will please come to order. The first number this evening is "Insect Pests as they relate to Rural Hygiene, with special Reference to Control." by Professor W. B. Herms of Berkeley. (Applause.)

PROFESSOR HERMS. *Mr. Chairman, Members of the Convention, Ladies and Gentlemen:* The topic that I have selected for this evening's talk is slightly different from that indicated on the program. I have omitted one word. Instead of speaking of it as "Insect pests" I want to refer to the subject as "Insects," omitting the word "pests."

INSECTS AS THEY RELATE TO RURAL HYGIENE, WITH SPECIAL REFERENCE TO CONTROL.

By Prof. William B. Herms, University of California.

On first thought there seems to be little relationship between insects and disease, but a little observation will at once reveal much that is good and much that is bad about these tiny winged creatures. A great educational campaign is sweeping over the entire world at the present time which has as its aim the hygienic betterment of the human race, pointing out certain dangers to health and happiness which lie on every side. There is, however, room for criticism, inasmuch as the methods used tend largely to frighten people without pointing out the methods applicable in the correction of the evil. Fear is at the root of much disease, and is disastrous. Boldness and daring, however, in the face of danger may also lead to disaster. It is, nevertheless, notoriously true that we as a nation in our hurry to make a living have to be warned over and again

of lurking danger; we go heedlessly on until we are frightened into action. Can we not calmly consider these questions of hygiene in the light of preventive medicine, acting wisely and quickly, not hastily gaining time and averting disease in the end? Our nation is a business people and business propositions appeal to us. If it were told you that it is possible to save ten millions of dollars annually, you would be ready to figure at once. Yet the American people spend annually more than twelve millions of dollars for fly screens, fly paper, fly poisons, and the like, not even to mention the great loss of life estimated in the hundreds of millions of dollars lost through preventable diseases in which insects play the most important rôle, as in typhoid fever and other enteric diseases, malaria, and yellow fever. Added to this great loss are the still further millions due to insects as they relate to the stock raiser in Texas fever, anthrax, warbles and the like. If there were time to add another phase to this direct loss it would be instructive at least to point out the tremendous loss to man as he is impaired in vigor through malaria, a loss to himself and family as a producer. Then, too, the depreciation of real estate value through the prevalence of malaria, yellow fever and the like, is an item of no small import.

When it is considered that we are here dealing with matters which are largely if not entirely preventable, is it not worth our while to consider somewhat more specifically the relation of the insect to rural hygiene, and determine as far as possible in a brief way a few methods of control?

INSECTS AS SCAVENGERS.

Nature has provided no better scavengers than the flesh flies which devour through their larvæ literally tons of dead animals every season. The vile smell emanating from one dead rat or from one dead fish can better be experienced than described, but imagine the pollution of the air that would exist if the masses of dead animals left to die without burial were not reduced through the agency of the flesh fly larvæ. In a study of the conditions existing along the shores of the Great Lakes the writer made observations for five summers on the relation of the insect scavengers to the beach débris. For a distance of one mile as many as 538 dead fish (mostly small) were cast up during one night by a high surf, the weight of these fish was 20.38 kilograms (about 45 pounds). This was about an average mile, and thus dead fish were strewn for many miles, and this casting up of bodies was regularly repeated at short intervals. A walk along this same beach about three days after a storm demonstrated most satisfactorily the effective work of the flesh flies, since the dead fish and other animal bodies were reduced to mere shells which were comparatively odorless. In weight the individual fly increases from 0.2 mg. at birth to an average of 90.2 mg., or an increase of 45 one-hundredths per cent of the original weight. Since this applies also to the reduction of animal matter in general, these few statistics are given to demonstrate the efficiency of this particular group of scavengers. What is true of the two or three species of flies just referred to, namely, the green bottle fly (*Lucilia cæsar*) and the large gray flesh fly (*Sarcophaga sarraceniæ*), is only true of certain other scavenger flies with very important reservations. The two flies mentioned are typical insects of the great out-of-doors, rarely coming into the

house as does the blowfly (*Calliphora vomitoria*), and therefore rarely attacking the prepared foods of man. We have now pointed out the qualities of a good natural scavenger, namely, it must do its work effectively and it must not enter the dwellings of man to attack his foods prepared for use. Certainly, this does not apply to the common house fly.

The annihilation of a species whether complete or relative always brings opposition. Few ideas are more firmly rooted in the mind of the average man or woman than that Nature has brought forth nothing that is useless in the economy of the human family—it must be good for something, otherwise it would not be in existence and should therefore not be exterminated nor even molested. True it is that we must study Nature's ways and endeavor to find out what she is trying to do, then help her to carry out her plans more quickly and more accurately. For instance, if Nature has provided scavengers, she is endeavoring to clean up, thus pointing out to man what *he* should do. The house fly is often spoken of as one of Nature's scavengers. By a careful study of the performance of this function by the fly, it can be said without question that the house fly is a poor scavenger and it certainly does not stay out-of-doors. The house fly breeds primarily in excrementitious matter, and this of all offal from animals and man is the most dangerous source of infection. Thus all evidence is against the house fly, and certainly no one would suggest that the house fly be left unmolested, because it helps man to keep his premises clean (which it does not), and that which the fly might be liable to reduce a little should not be permitted to accumulate exposedly on the basis of ordinary rules of sanitation.

THE HOUSE FLY AS A CARRIER OF DISEASE.

It may be said without hesitation that the house fly is one of the most dangerous animals, the greatest menace to human health. It is so, largely because it is generally regarded as an innocent creature, and because the labeled disease in large parcels is not observed, of course, there is no evidence. There is more first class experimental evidence against the fly to-day than there is against any other insect, except the mosquito. The fly is dangerous because of its vile breeding and feeding habits, during which time it may become loaded with disease producing organisms. The mouthparts and feet are perfect collectors of filth. Each one of the six feet is equally fitted with bristles and hairy pads which secrete a sticky material, adding thus to their collecting powers. The diseases which it is possible for the house fly to transmit and which have been proven against it are typhoid fever, dysentery, summer diarrhea in infants, cholera, tuberculosis, hospital gangrene, and several other disease for which the evidence is as yet meager. Now the causative organisms ("germs") of the above mentioned diseases are found in the excrement, vomit, sputum, and pus, all of which form articles of diet for the fly, and the mode of infection is by way of human food (wounds in the latter case) which are contaminated, or infection of wounds and cuts in gangrene. Time alone prevents us from dwelling on the details of infection.

From 75 to 125 eggs are deposited in one mass, and there are usually several (2 to 4) such layings. The eggs hatch in from twelve to

twenty-four hours, and the newly hatched larvæ begin feeding at once. To gain an estimate of the number of larvæ developing in an average horse manure pile five samples were taken from various parts of the pile and the larvæ counted, the weight of the samples being previously taken. The total weight of the samples was fifteen pounds and the total number of larvæ (maggots) was 10,282, all of which were quite or nearly full grown. This gives an average of 685 larvæ per pound, and the entire pile was estimated at not less than 1,000 pounds, of which certainly two thirds was infested like the samples. A little arithmetic gives us the astonishing estimate of 455,525 maggots in an average manure pile of only four days' standing. This particular manure pile (not from a livery stable, either) was only one of many known to exist in various parts of the city. No wonder flies fairly swarm in the vicinity of these choice ornaments!

The growing or larval stage requires from four to six days, after which the maggots often crawl away from their breeding place, many of them burrowing into the loose ground just underneath the manure pile, or crawling under boards or stones, or into dry manure collected under platforms and the like. The maggots often pass three or four days in this condition before they change into pupæ (the resting stage), recognized as small chestnut colored barrel-shaped objects in which the maggots transform to the winged fly. This resting stage requires from five to ten days and more, varying according to temperature; thus the time necessary for a fly to develop from an egg to the winged insect, as we know it, is usually from twelve to fourteen days in midsummer.

We are now familiar with the facts of development and habit and have this knowledge as a basis for action against the pestiferous and dangerous fly.

ESSENTIALS OF HOUSE FLY CONTROL.

Methods of control are planned along the lines suggested by the study of the life history and habits of the insect. The more familiar we are with these two factors, the better able are we to attack the problems of control. Usually the most vulnerable stage in the life history is selected at which time the insecticide may act most speedily, or during which time permanent preventive measures are most effectively applied. Certainly wherever the breeding places can be eliminated, this method should be followed. It has been already pointed out that at least ninety-five per cent of our city house flies have their origin in the open horse manure pile, and that the remainder are bred in the open garbage can and similar situations. The point of attack is clearly shown. *The open manure pile must be abolished and stables must be kept clean.* Receptacles containing kitchen refuse must be kept tightly closed or screened and refuse of any kind must not be thrown out into the backyard to decay. The reason for this cleanliness in human habits is to prevent the female house fly from depositing her eggs upon the material which is to provide food for the maggots.

Permanent preventive measures will always be far less expensive in the end, and also very much more effective than the application of temporary methods in the form of insecticides, which must be applied over and over again with continuous expenditure of time, labor, and money.

MANURE BINS AND PITS.

There must necessarily be some way of disposing of manure from stables, but the old method of merely throwing this material outside the barn door and allowing it to accumulate there for months at a time is not only disgusting, but is a menace to health. The open manure pile must be abolished. The effectiveness of fly-tight (*not air-tight*) manure receptacles has been demonstrated beyond question; it only remains to be decided as to what form is most practical and carries with it the least expenditure of time and money in construction and best results for a given case. A closet or bin can be constructed at a small cost, which is satisfactorily offset by the absence of the fly nuisance. Such a closet may be built in one corner of the stable with a small screened door, through which the manure is thrown when cleaning the stables (providing also for ventilation), and an outer door giving access to clean out the closet once or twice a week, or a closet of about the same construction may be built in the form of a shed or lean-to connecting with the stable by means of a small screened door as above. In all of these cases the manure must be emptied at short intervals and should then be scattered on the field. Objection is here raised by such who wish to use rotted manure for fertilizer. I believe the best plan, then, is to construct a pit in the ground into which the manure is thrown. The pit should be deep enough so that the manure will remain far enough beneath the level of the ground to cover the pit securely with a fly-tight roof. Frequent and heavy liming will aid greatly in attaining the object desired.

INSECTICIDES FOR MANURE HEAPS.

The purchase of insecticides for continuous use on the manure pile would be a matter of no small cost, especially because of the tenacity of life shown by fly larvæ and the consequent strength of insecticides necessary to kill them. The cheapest, and at the same time effective, preparations now available must be applied in strength two to five times that which is useful against other insects, and furthermore, the larvæ can not be easily reached buried as they are in the bedding and offal. Chemicals used to destroy the larvæ (maggots) in the manure pile may be roughly divided into two classes (1) contact poisons, and (2) stomach poisons. To the first class belong such preparations as the kerosenes (generally used in the form of emulsions) and the cresol preparations, also chloride of lime. To the second class belong the arsenicals represented by arsenate of lead and Paris green. All of these insecticides are more or less effective when used in proper concentrations and in sufficient quantities, but none of them can be applied with any degree of safety to man or the domesticated animals, because of either their inflammable, poisonous or corrosive nature. We are, consequently, again forced to recognize the utility of fly-tight receptacles for the manures. While the experiments with tobacco decoctions applied to the manure pile have not proven successful, the use of tobacco dust liberally intermixed seems to offer better results.

CLEANLINESS ABOUT STABLES.

The writer has been called in on frequent occasions to explain the presence of many flies about stables which were said to be in "perfect condition." Three instances may be mentioned. In one case the inside of the stable was in good condition, the manure being thrown out in a heap and removed every four or five days. It was said that surely no flies could develop under such conditions, inasmuch as it required ten to twelve days to become full fledged flies. The error is evident at once, namely, it requires only four or five days for the maggots to reach their full growth, after which many of them migrate from the manure pile proper into the loose ground underneath or into near-by débris. Removing the manure pile every four or five days, therefore, did not eliminate the trouble; indeed, it was shown that hundreds of maggots were present in pockets under the site of the pile, and furthermore 2,561 pupæ were taken with one and three fourths pounds of manure collected at random from underneath a platform leading from the stable. Thus there remained no further question as to the source of the flies in that locality. The second instance seemed to have a better basis for doubt. In this case the stable was provided with a cement floor with good drainage and the manure was thrown every morning directly into a cart and immediately hauled away. Now, where did the swarm of flies come from? Adjoining the stable there was a very small lot in which the horse was frequently set free. No attention, of course, was paid this open lot, and manure collected there which was kept fairly moist with urine and here literally thousands of house fly maggots were developing. Again the problem was solved, the horse lot was thoroughly scraped and thereafter kept clean. The third instance was easily explained in part, and eventually entirely elucidated. In this case it was a certified dairy. Flies were abundant; where did they come from? The horse stables were found to be partly floored with cement, but the stalls were made of wood planks with wide crevices between. In these crevices manure had collected abundantly and maggots were found there in large numbers. But that was not altogether sufficient to explain the situation. It is, of course, well known that cow manures, unless accumulated to retain moisture, are not favorable breeding places for house fly maggots and none were found. But there is no excuse for not properly disposing of cow manures, inasmuch as the horn fly develops here, one of the most troublesome cattle pests. Further search, however, brought to light the fact that the cattle were being fed at that time on "brewers' grain" much of which remained unconsumed and was "dumped" upon the field as waste. These piles of waste "brewers' grain" were found to be literally alive with fly larvæ, and again the mystery was solved. These three instances will suffice to make clear the range of breeding places to a large extent and also the necessity for careful inspection of premises.

THE FLY IN THE HOUSE.

Nearly all efforts thus far to destroy the fly have been directed toward the winged insect, to either destroy it in the house or drive it away. These are certainly laudable efforts, but will only afford in all cases temporary relief. The fly continues to breed, and one fertilized female can be the progenitor of countless thousands of flies in one season.

Until the permanent methods of control come generally into use the utmost care should be exercised to keep this most dangerous of disease carriers out of the house. Thus properly screening both windows and doors is important. Grocery stores, fruit stands, candy shops and butcher shops, bakeries and restaurants, which do not protect their wares from the flies, should be compelled to do so by health authorities and patrons should insist upon this precaution. A little public sentiment in this direction will work wonders.

The use of the ordinary fly poisons is objectionable, since poisoned flies are liable to fall into prepared foods and cause mischief to the consumer. Furthermore, not a summer passes without its toll of innocent children whose lives have been lost, generally in extreme agony, by drinking some deadly fly poison. The writer has found (as already suggested by others) that formaldehyde, properly used, forms a very good substitute for arsenical or cobalt poisons. This liquid material is rather inexpensive when used as indicated and has the added advantage that it is not poisonous to man, and may, therefore, be used with impunity around food; it is also one of the most powerful germicides known and is not injurious to delicate fabrics. Formaldehyde, as purchased at the drug store, is in about a 40 per cent solution and should be diluted with water down to 5 per cent to 8 per cent; in other words, add five to six times as much water. This dilution must now be sweetened well with sugar or other sweet. A good plan is to partly fill a shallow individual butter dish with the diluted formaldehyde and add about one fourth teaspoonful of sugar, then place the dish on the table or in the show window. The flies drink this material and die in great numbers not far from the insecticide. It is not an easy matter to control the fly in a dining-room where there is plenty of liquid material for food and drink, such as water, milk, sweets, etc., but where this can be removed in the evening and the dishes with formaldehyde substituted so that the flies will drink this the first thing in the morning the end will be accomplished much more readily. One is here taking advantage of the fact that the flies seek something to drink as soon as they "awaken" from their sleep in the morning.

MOSQUITOES.

We must now briefly turn our attention to the mosquitoes. Among the several species of these insects existing in the State of California there are also the *Anopheles* or malarial fever mosquitoes. No fact in medical science is perhaps more certainly established than that malarial fever is transmitted by mosquitoes of the genus *Anopheles*. However much a man might expose himself to the miasma of swamps and the steaming tropics he could never contract malarial fever except through the bite of an infected mosquito. Malaria is caused by an unicellular animal parasite which lives a certain part of its life in the red blood corpuscles of man. The destruction of these corpuscles when the parasites are numerous induce the paroxysm of chills and fever, which occurs at regular intervals due to the regular developmental cycle of the parasite. The direct loss of life due to this disease may not seem to be great, but it is one of those affections which produces great inefficiency in performing one's ordinary duties. Herrick has well stated the matter thus: "The loss of energy and enthusiasm, the loss of interest in one's own

efforts and successes, all of which contribute enormously to the efficiency of labor and cause the wealth producing power especially in agriculture to fall short of its normal capacity, is due in a marvelous and undreamed of degree to that life-sapping disease, malaria. The man that is just able to 'crawl out of bed and drag around' is certainly not the man to accomplish an efficient and full day's labor."

The greatest demonstrations of disease control have been made in parts of this country, in Cuba, Honolulu, and Italy, in controlling malaria and yellow fever. Considerable work in mosquito control has been accomplished in various parts of this State. Mosquitoes breed in pools of standing water, tide pools, along the margins of slowly moving streams, in tin cans partially filled with water, in rain barrels, watering troughs and the like. Indeed, very little water is necessary to breed hundreds of mosquitoes. Again, the control measures require the elimination of breeding places or the application of a chemical which will destroy the wigglers. Drainage or filling up of unnecessary pools in spring, overturning of receptacles which might collect water, in fact, a little precaution will again save many a mosquito bite and perhaps cases of malaria. A few teaspoonfuls of kerosene on a tank of water or a small pond will serve very well; open-box privies and cesspools should always be so treated at frequent intervals. In irrigating the water should not be allowed to remain in pools for long periods at a time, say not over several days. Usually twenty-four to forty-eight hours will suffice for ordinary irrigation purposes, and flooding for longer periods represents gross neglect or carelessness. Water standing over ten days would be dangerous since the larval and pupal life of the mosquito may be passed in less than two weeks. The use of metal, cement, or tile irrigation ditches which will not only prevent lateral seepage, except where wanted, will help greatly in lessening the great quantities of mosquitoes now produced in poorly kept ditches. The metal, cement, or tile ditches can be kept clean easily and the water running. Experiments on a small scale show conclusively that the addition of a very small percentage of tobacco decoction will destroy both wigglers and pupæ, how successful this will be on a large scale remains to be proven, but I have hopes that it will prove out well, and will then be a good substitute for kerosene, with the addition that the nicotine containing water may be used with impunity for irrigating purposes.

If the resident of rural districts will apply himself to the correction of such unnecessary surroundings as have been here briefly pointed out, he may expect to be amply repaid for his trouble. The most beautiful and enjoyable parts of this earth are found among rural surroundings and may be made more and more so by the expenditure of a little extra energy in keeping things clean and in order—the rules of rural hygiene are few and simple. (Applause.)

PRESIDENT JEFFREY. Fellow delegates, if you would like to ask any questions of Professor Herms we will have ample time to-night.

MR. KELLOGG. I have been exceedingly interested in that paper and a whole lot of reforms have gone through my head, but there is just one question I want to clear up in my mind. I have lived in new countries at different times and where they were troubled with malaria, and we said, as the country got older, we were not so troubled with malaria. I would like an explanation of that.

PROFESSOR HERMS. Not of the true malaria, I should say. Of course, in the transmission of a disease like malaria or any one of these diseases just referred to, you must first figure on the disease being there in order to be transmitted. Of course, the house fly could not transmit any of these enteric fevers, like typhoid, if typhoid were not there to be transmitted.

MR. DARGITZ. Just a little incident that occurred about a year ago. It shows how easily we sometimes can eradicate these pests. I was called to a neighbor's where they stated that the mosquitoes had become such a pest that they were inclined to sacrifice their property and go back East, had become disgusted and thought California was nothing but a nest of mosquitoes. I made some inquiries and finally told them to pour half a cupful of kerosene in the sink and let it find its way to the cesspool through the drain, and they did so, and in twenty-four hours they said they had no more mosquitoes and had none after that all summer.

PRESIDENT JEFFREY. The next on the program is "Planting Good Health on the Farm," by Dr. W. F. Snow, of the State Board of Health. (Applause.)

PLANTING GOOD HEALTH ON THE FARM.

By Dr. W. F. Snow, Secretary State Board of Health.

Planting good health does not differ in principle from planting any other crop. Good seed must be sown in the right soil and with due regard to the environment. Many things must be done between the planting and the harvest if one expects a maximum yield. The fruit farmer follows up his planting by making a business of aiding the growth of his trees. He protects them against drought by irrigation, against frost by smudging, against insect pests by fumigation, and by the importation of friendly insects to prey upon the pest.

The infant trees are wrapped in swaddling clothes in winter and provided with sunshades in summer. Being clothed they must be fed. The farmer studies their diet and buys the necessary fertilizing chemicals advocated by the horticultural experts. Their leaves must have sun and their roots must be housed in properly ventilated soil, therefore, the farmer cultivates his land and battles with the weeds. And all the time he is saying to himself, "In a few years more they will begin to bear fruit."

The placing of wind stakes and props, the digging for borers, the all-night irrigation, the fight with the birds and the rabbits, are but incidents in the day's work of the successful fruit farmer.

And then when the crop has matured must the trees be ruined and the fruit lost because there are no strong men to harvest it? Has the farmer, in his efforts to grow trees, forgotten that it is necessary at the same time to grow boys and girls if he would ultimately reap the full reward of his planning? The labor-problem is unquestionably a serious one for California horticulturists. A most important factor in this problem is good health, and this can be cultivated, adapted to the environment, and made to yield good returns. It is, therefore, a legitimate subject for your earnest consideration during this convention.

There are two great obstacles to interesting people in the cultivation of good health. In the first place, the normal baby born to healthy parents has a tremendous vitality and power of adaptability to its environment, which distinguishes it from the little tree. This gives rise to the impression that with the baby the proportions of food and sleep, air and sunshine, work and play, are of little consequence. In the second place, from fifteen to twenty years are required to mature the crop, which since the days of slavery has had no directly quotable market value when produced.

It can be demonstrated, however, that good health is a valuable crop. Each of us, for example, expects to live to be at least sixty or seventy years old. And if we come of good stock, have been carefully cultivated and have developed good habits, we ought to live this long. Yet each of us knows of a number of friends with similar expectations who became blighted and died, some of tuberculosis, some of typhoid fever, or malaria, or diphtheria, or scarlet fever, or any one of a hundred other causes. When we stop to think of it, most of them died before the age of thirty or thirty-five. The twenty years or more they might have lived would have been most valuable to the prosperity of California. Many of these friends have been young men with families. Each man's labor would have provided at least $1,000 a year, which means a loss of at least $20,000 to $30,000 for his family. Even if he carried a $5,000 or $10,000 life insurance policy it was still poor business to die.

Suppose this young man had come out to your neighbor's farm to pick fruit and had contracted typhoid fever as a result of unsanitary conditions, which his employer permitted to exist in violation of the State law. (Professor Herms has just explained to you how this infection may be transferred by flies.) And suppose this young man's wife should sue your neighbor for damages and you were drawn for jury duty, would you award her a competence to care for her babies, or would you ask your minister to present evidence of some manifestation of Divine Providence in your neighbor's negligence? California has over six hundred deaths a year from typhoid fever alone.

Dr. Woods Hutchinson has somewhere remarked, "It is really not so wonderful that we are alive when we consider the length of time we have been at it since the original man passed the spark of life on to his descendants." The wonder is that in these millions of years we haven't learned to live longer. Within the brief period of recorded history the average length of life has been gradually lengthened. In certain countries this increase has reached fifteen and even twenty years, but the average length of life is still considerably below forty years. The addition of one year to the life of each citizen of California would be equivalent to adding 100,000 people to our industrial population. Is not this added population the thing for which our boards of trade and chambers of commerce are striving?

The Sacramento Valley farmers recently pledged themselves to spend $50,000 in advertising for additional settlers. Is it not probable that they would also invest in good health if it can be proved to be an equally good investment?

Every active horticulturist knows in a general way how much nursery stock is lost each year through the ravages of plant diseases.

He can also know, if he will, just how many babies are lost through the agency of human diseases. If he studies it out he will see that the prevention of the latter is just as important to him as the prevention of the former, even from a purely business point of view. Both babies and young trees represent potential investments from which there should be large returns in future years.

You are all familiar with inspection and quarantine as applied to fruit-bearing trees. If your right-hand neighbor's orchard is invaded by the San Jose scale you want to know it so that you may protect your own trees. It is just as logical that you should wish to know when your neighbor's child develops scarlet fever. The United States Public Health and Marine Hospital Service is charged with the duty of inspecting the passengers and crew on each incoming ship and of making a careful medical examination of all immigrants. This procedure is the same in principle as the inspection of all imported trees for evidence of plant diseases. The difference comes later when the tree has to submit to continuous observation, and quarantine or fumigation if it "catches" anything, while the newly made citizen maintains that it is nobody's business but his own what diseases he may have or how he may treat them after he gets into the United States.

Individual liberty is a precious thing to all Americans, and in order to preserve it we often permit one citizen to infringe the rights of many. One third of the business of our undertakers in California is based upon our exaggeration of individual freedom at the expense of the public. At present we are burying annually upwards of 10,000 of our children and young adults because of diseases contracted from other diseased persons, who came among them. Of course, the proposition to save these 10,000 lives a year would work a hardship on our undertakers. But this would readjust itself in fifty or seventy-five years, through the great increase in deaths from "old age," and meantime our industries would have the benefit of a steady annual income of 10,000 workers and their accumulated families. Does this not sound like a good investment?

There is another way to estimate this. The commission on conservation of natural resources, appointed by President Roosevelt, estimated the community value of the average life to be $1,500. California is thus losing approximately $15,000,000 a year because no provision is made for enforcing laws already on the statute books. All these things are not theory merely, they are hard business facts. We have been applying to human life in California exactly the same principles which we are now condemning our timber barons for applying to our great forests. With him it has been so many million feet of lumber per year, with us so many million hours of labor. We have cared no more for repopulation than he for reforestation.

We must include conservation of health among our other plans for the unborn generations if we are to hope that America will continue her progress toward supremacy in the industrial and scientific world.

The requirements of good health are very simple to enumerate. They are sunshine, fresh air, good food, enough sleep, plenty of play, work for which one is adapted, and protection from the disease invaders. But these requirements are not easy to fulfill for many occupations even in California. Are they possible on the farm?

First, sunshine. It would seem so, and yet how many farmers' wives scarcely see the sun from one week's end to the next? How many farmers' daughters contrive to avoid the health-giving rays of the sun, the while they industriously apply so-called skin foods? How often does one see at the seacoast whole families taking the fashionable sun-cure in bathing suits, or with bare heads and sleeves rolled up. This is the same sun which shines on the ranch, and is so carefully excluded from the parlor and bedrooms lest it fade the carpets.

Fresh air should be available on the farm, but often the only member who uses it to any considerable extent is the farmer and he has it only in the day time when he needs it least.

Fresh air has different qualities. There is the cool breeze that comes in off the ocean, and the hot wind that blows across our great valleys, and the night air currents that flow down through our murmuring forests. Each plays its special part in the environment of the body, but all are fresh, and are alike invigorating to the lungs. The fallacy of dangerous night air has cost the human race untold numbers of lives. The sleeping porch is the most effective weapon we have thus far used to combat tuberculosis. The old-fashioned fireplace was a most important fresh air apparatus, because it constantly drew into the house great quantities of out-of-door air to replace the hot air it sent up the chimney. The present day air-tight heater and oil burners are economical of fuel but most expensive in headaches, drugs, and doctors' bills.

It is poor economy to utilize unfinished attic space for bedrooms for the growing family. The rooms of a house which depend on ground air forcing its way up through the walls and floors from mildewed cellars or malodorous kitchens, or closets, are not the rooms in which good health will flourish. Such air will not cause any specific disease, but it will lower the resistance of the body to disease. Sanitarians estimate that sleeping rooms should have for each occupant at least 500 to 1,000 cubic feet of air space exclusive of the cubic space taken up by the bed and other furniture, but this depends on the ventilation, *i. e.*, the frequency with which the air of the room is changed. The farmer who screens in his porches for sleeping purposes and uses the bedrooms only as dressing rooms will have plenty of air and few bills for medicine.

The selection and preparation of food for the family is a very important factor in farm life. The farmer knows his land and sows his crops advantageously with reference to the soil. It is equally important that the farmer's wife know her family and prepare her table according to the varying needs of the individuals. Simplicity, variety, the best materials, and proper cooking are the general requisites. The normal healthy individual may count on his appetite to guide him in what he eats from day to day. His stomach is simply one of the way stations along the alimentary canal, from which the body helps itself to such tissue-building and energy-producing ingredients as it needs, leaving the excess to be passed on and discharged day by day. "I never know I have a stomach," is only another way of saying that one has good digestion. But if this be said by all the members of the family, it means there is a clever housewife in command of the kitchen, who realizes that her position is that of commissary general. The standard army ration is not sufficient for her needs. First, she must

provide her husband with sufficient energy-producing food for the heavy muscular activity of his day's work. Then she must provide the body-building food necessary for her children, who are sitting quietly in school, but are growing all the while, then the baby needs his food prepared and administered with clock-like precision. It is necessary that she plan her own diet, and have regular hours for her meals. Then, if she provides the means for the farm hands, she must study history and know how to cook the national dishes of her husband's employees. And this is only the foundation of her problem. Cooking for the climate is a most important part of her work. This means pork and beans for cold days and cool salads for hot days. It means shifting the meat dishes to the breakfast meal in the picking season and the substitution of nuts and macaroni for the dinner meat in the idle rainy season. It means hot, appetizing heavy suppers from June to October and simple bread and milk suppers before the open fire from December to March.

Cooking for one's ancestors is more important than is at first apparent. Suppose a young Massachusetts farmer comes to California to raise apples and eventually marries one of the daughters of old Spain. Is it not certain there must be some adjustment between his ancestral love of pie for breakfast and her desire for enchiladas?

Enough sleep is not a matter of the number of hours we may spend in bed. The purpose of sleep is to provide complete cessation of activity, so that the body may be repaired for the work of the next day. The individual who makes a business of sleeping and who sleeps in the open air will get his sleeping done in much less time than the one who cultivates the habit of reviewing the day's events and making out a trouble schedule for the next day before he gets to sleep.

Play is but another form of rest for the adult. Play serves many purposes for the child, but it is a necessary thing for the father and mother as well as for the child. The parents who are too old or too busy to play with their children will find their influence over those children steadily slipping away. It is real economy for the mother to take the girls to the best theater plays and to hear good music. It pays for the father to go with his boys to see the city, and to show them what is safe and what is unsafe in its varied amusements. It is a good investment to take the family to the high Sierras or along the coast in the summer. The telephone is not a luxury. It is important for the tired mother to have her recreation, and the relaxation of a daily visit with her distant neighbors on a ten-party line is part of the family play. The current magazines and a good phonograph or pianola with well selected music yield big returns on the purchase price.

It pays to grow flowers and to use them in the decoration of the house. The box of candy one occasionally buys for his wife is not foolish sentiment. These are the things that make the *home*, as distinct from the house. Anything will serve for a house, provided it be dry and light and airy. By this I do not mean that a modern, well arranged house is not desirable. A convenient kitchen and the various labor-saving household devices are worth all they cost. But the most sanitary and convenient farmhouse that can be built will soon degenerate in the course of a generation into a "chuck house" for hired men unless the atmosphere of the home be created. This requires study

and the well directed expenditure of some money. The Country Life Commission has pointed out in no uncertain terms that if we would conserve our farms we must make them livable.

How often have the half-ills and discontentment due to unvaried and incessant work on a cheerless, homeless farm led children to unwise immigration to the city. The farmer is too busy, the mother is too overworked and disheartened by the monotony of her daily round to investigate the half-ills of these children, and in the end they go. The neighbors say, "Well, I don't rightly know what was the matter with the Doe family. They didn't like the farm. The old man and his wife still stick to it, but the children have all scattered. The two girls are clerking in some store in the city, and the last I heard of the youngest boy he had a job hauling lumber somewhere in the mountains. Poor stock, I guess." More often it is poor opportunity. If our farmers would apply the same keenness of observation and deduction to the development of good health on their farms that they apply to the development of good trees, the number of farmers whose sons are also farmers would increase many fold.

The generalities which have been emphasized thus far deal with things which a man may provide for himself and his own family without coöperation from his neighbors, but there are many other things entering into the health of the farm which require coöperative management. Professor Herms' excellent paper has demonstrated how the mosquitoes of the farmer's right-hand neighbor may bring him malaria, how his left-hand neighbor's flies may bring typhoid fever. His neighbors to the north come to call, bringing their baby, and the baby leaves the whooping-cough. His neighbors to the south in the course of years contribute many expensive things. Scarlet fever comes to him in his cream cans, which are returned from the city each day. The passing tramp frightens him with smallpox, and the temporary fruit picker suggests many possible dangers. It is only by community coöperation that these experiences—expensive alike in life and money—may be avoided.

In conclusion, let me repeat good health is a crop, and demands attention and necessary outlay of money if adequate returns are to be expected. (Applause.)

PRESIDENT JEFFREY. I think you will all agree that we have had a treat to-night, and I know how well you will all appreciate the remarks we have heard from the two friends who have come down here to-night for this special purpose.

The convention then adjourned until December 10, at 9.30 o'clock A. M.

FOURTH DAY.

WATSONVILLE, CAL., December 10, 1909.

PRESIDENT JEFFREY. The convention will please come to order. I would like to ask if the Committee on Resolutions are ready to finish up what little business they have?

MR. KELLOGG. On that matter of unfinished business yesterday, laid over for to-day, the committee would amend their report and have it read as follows:

RESOLUTION AS TO FORMATION OF PROTECTIVE LEAGUE.

Whereas, There are many general problems affecting the fruit industry aside from the marketing of fruit, in which our interests are identical, and upon which we can unite for the good of all concerned upon common ground; therefore, be it

Resolved, By the Fruit Growers' Convention, that the fruit interests would be best subserved by the organization of a league, or association of some character, to look after the freight rates, standardizing of the fruit pack, uniformity of packages, and other matters, looking to the harmonizing and helping all interests.

Resolved, further, with this end in view, we recommend that a committee of ten fruit growers be appointed by the Chairman of the convention representing all interests, as far as possible. This committee to meet as soon as possible, formulate a plan of organization with such constitution and by-laws as they may think wise, and submit for approval to a delegated convention to be called by them, in the city of Sacramento, within the next sixty days, if practicable, the said delegates to be duly accredited from established organizations representing the fruit interests of the State. We recommend that the said delegated convention effect a permanent organization, for no profit to themselves, but for the general interests of the whole fruit industry.

Mr. Stephens moved the adoption of the resolution and his motion was duly seconded.

PRESIDENT JEFFREY. The resolution means simply that a committee of ten fruit growers will be appointed to formulate a plan for organizing a protective league of some kind to take up general propositions relating to deciduous fruit and grape industries, general propositions touching the interests of everybody connected with the business, railroads, fruit distributors—every interest must be handled by some central authority.

The resolution was unanimously adopted.

MR. JUDD. *Mr. Chairman, Ladies and Gentlemen:* We had a paper yesterday, or rather a speech made by Mr. Irish, which covered a very large scope and at the same time it brought the question of education down to my idea of what our youths, especially the agricultural youths of this State should have. He said nothing about the Polytechnic School at San Luis Obispo, which has something like 150 or 160 students. It is one of the most progressive institutions of learning in this State. It is a place where a young man can get any kind of an education he wants, whether agricultural, mechanical or almost any other except the professional education. I want to call your attention to that particularly in the form of a bulletin, the agricultural number, published by the class, and all you people that have an interest in the Polytechnic School, which is the very essence of education for our agricultural youth. I want you to get one of these and also the bulletin, and it will give you some idea of what is being done in the State for your boys and your girls that you don't know anything about.

PRESIDENT JEFFREY. We will now have the "Precooling of Fruit," by George D. Kellogg of Newcastle.

MR. KELLOGG. Mr. Chairman, first I want to say a word. I have taken a great deal of interest in something more than the fruit industry, and that is the character of this convention. We have met in this beautiful place that many of us hold sacred and I have yet to see the first breach of good behavior in recognition of the place in which we have met. I believe the fruit growers are a pretty good class of people to be with, clean, intelligent, upright. Mr. Dargitz insisted upon a text, and the only one I can think of just now, and I can't tell you just where it is, but if he will look in Ezekiel somewhere he may find it: "For because ye are neither cold nor hot I will spew ye out of my mouth."

MR. DARGITZ. Revelation.

MR. KELLOGG. I guess it is. [Laughter.] I am not here to throw any hot air, but I am to throw pure cold air. I don't come before you with any scientific proposition. I am simply going to deal with facts as I have found them from my own observation. I let the theory go to these professors who study it and know why these things are so.

PRECOOLING OF FRUIT WITH DRY COLD AIR FOR SHIPMENT.

By Geo. D. Kellogg of Newcastle, California.

Mr. President, J. W. Jeffrey, Ladies and Gentlemen: Reform and progress have become the watchword of the California fruit men. It is a well known fact that a slight bruise or abrasion on any fruit will affect the keeping quality of the same; this has been discovered, and padded picking baskets or buckets will be installed during the coming season; springless wheel sleds will be discountenanced and discontinued by the up-to-date grower and vehicles with springs will be used in their place to give ease of carriage and supplant them. The frequent dumpings from the tree to the packing shed will be eliminated, and the farewell to the old dead axle wagon between the packing shed and the shipping house will be sounded. The standardized pack, with correct comprehensive markings upon the package, under the supervision of a competent corps of independent inspectors will be a reform of great consequence, bringing increased reputation and standing, as well as additional dollars for our California fruits.

All this, and still there stands before us the great problem of how to get this fruit into the Eastern markets in such condition as to command the attention and admiration of the consumer. Refrigeration has been tried, and under the old system has proven a help—though expensive. The crying need is for something better.

The Agricultural Department at Washington, D. C., recognizing the great importance of the fruit industry, detailed their expert, G. Harold Powell, as Pomologist in charge of Fruit Transportation and Storage Investigation. This worthy official came to Newcastle, California, in the summer of 1905 and began his investigations and experiments, and the taking of valuable notations. He improvised a cold storage car, and after holding the fruit for twenty-four hours or more, it was transferred to another cold car and shipped to the Atlantic coast.

This experiment was conducted during the extreme heat of an extreme season and proved beneficial. These experiments were conducted from my office, with the coöperation of the fruit shippers of Newcastle. We had free access to the valuable data obtained from Mr. Powell's observations and notes. Frequent discussions led us to believe that if the fruit could be precooled by the single box before placing in the car, quicker and better results would be obtained. Mechanics of inventive talent and experts in refrigeration were consulted, combined with those having experience in handling of fruit and knew its weaknesses and some of its possibilities. The situation was studied, the conclusions reached from observation, that fruit shipped under ice with no previous preparation was inclined to arrive at destination damp, and this dampness would create a mold that would be injurious to the fruit. It was also demonstrated by the Government experts that ripening proceeds much more rapidly when a fruit is severed from the tree, so that it comes nearer the point of decay in a few hours, or days, than it would have been if left hanging on the tree in the same temperature for a much longer period; therefore, the ripening must be checked as soon as possible after picking to prevent premature decay.

Experiments show that mold grows in the room in which the fruit is placed, if the air in the room is moist, and the flavor deteriorates if the air is impure, especially is this true as regards mold upon grapes. Dry cold air will prevent the development of rot, and pure air preserves the delicate quality of the fruit. Therefore, *a dry cold pure air* is ideal for the preservation of fruit and to maintain its natural quality.

The conclusions reached were these: The successful transportation of perishable fruits in refrigeration depends, primarily, upon the sound condition of the fruit; upon cooling it as soon as possible after it has been picked; on shipping it in packages which cool quickly thoughout; on a *dry, pure, cold air,* uniformly distributed in the car, or compartment, and on a free circulation of such air throughout the packages, and this cooling process should not cease until the pit, or center of the fruit, has been as completely cooled as the surface, for practical results.

With these ideas, and to reach the results sought after, a unique and practical machine was invented, which conveyed single packages of fruit through insulated compartments through which a stream of dry cold air was forced, and the fruit cooled thoroughly to the center, and to any desired temperature. This was done by the ammonia process, instead of ice. From this machine the fruit should be landed in a cooled room, which is vestibuled with a precooled car and this car loaded and closed up and shipped through to destination with the initial icing. Cars so treated will carry to any market in the United States without reicing, and will arrive dry and in sound condition. At least, that has been my experience and observation from my experiments with fifty-seven cars precooled with this process during the season of 1909, and in this season of scarcity of cars and poverty of ice. Of these fifty-seven cars thus treated there has been but one claim made for loss and damage in transit, and that car was precooled on Saturday and left standing in the open air until the Tuesday following, waiting for a car to come to be loaded into; three days in the heat nullified the precooling, I suppose, and bad results followed. I shipped an equal number of cars during the season that was not precooled, and there was

many claims for damage made. The usual time it has taken to reduce the temperature of these cars has been from one and a quarter to two hours. I experimented with cars in which the fruit temperature had been reduced from seventy-six degrees to from forty-four to fifty-five degrees, while the open air temperature would be ranging anywhere from seventy-five to one hundred degrees in the shade, the fruit arrived at destination without complaint. These statements may be verified from the files in the office of the California Fruit Distributors in Sacramento, through whom all my claims on loss in car loads are made. I have with me a list of the precooled cars, the date when shipped and the destination; by a comparison of this list with their files will verify my statement.

With but two exceptions did I make known to the consignees what cars were precooled and what were not, and no attempt was made to get special reports upon the car; I took this method that I might know the facts, for as my fruit is most usually sent to the f. o. b. markets, and if it arrives without complaint, the draft is paid with no grumble from the consignee, it becomes prima facie evidence to the shipping fraternity that the condition of the fruit is above suspicion; and when the fruit is delivered to the auction and sold at the best price with no one to "boost" the sale we are ready to accept the theory that the fruit was all right.

On one car I advised the consignee in New York, Mr. C. E. Thurston, that a certain car was precooled, and asked him to note its condition; this car sold at top price and the returns came back with the notation from him that "precooling was all right." On another occasion I notified Messrs. Longfellow Bros. Company of Minneapolis to note conditions of a precooled car, P. F. E. No. 6100, shipped on June 25th with an initial icing only, and the following report was received from them:

"Green fruit from Newcastle, Cal., received by us this morning: peaches and plums were in splendid condition, being firm and dry, and did not develop sweat after unloading, although the day was quite warm. We believe that your system of cooling fruit before it is loaded into the car will place the fruit on this market in much better condition than the present plan of icing cars and loading the fruit while warm. Wishing you success in your efforts to improve conditions in the fruit business, we are,

Sincerely yours,

LONGFELLOW BROS. COMPANY."

On August 27th, one of the hottest of the season, I loaded a mixed car of peaches, precooled, into a car that was cooled by being vestibuled to the cold room, with no ice, the car closed; it left the next morning. On September 7th the car was sold in Minneapolis auction, the twelfth day from the picking, and this car of peaches and assorted grapes was sold for $875, being the average price paid for fruit in that market that day.

Note that this car was *not cooled by ice, was not iced en route*, and was in condition to sell at average price; the cost of refrigeration was only the cost of the precooling; the cost for hauling five and a half tons of ice was saved the transportation companies, and the expense of holding the trains, with five or six icings, was all saved, so far as this car was concerned. All matters of great consequence to the railroad operating departments, which if could be applied to whole train

loads, would mean many hours of time saved in transit of the trains, to say nothing of great bunkers of ice, and the expense of many men saved.

These fruit meetings are not so much for hearing theories as for facts. California fruit men are facing active and intelligent competition from many states in the Union that have the advantage of hundreds, and even thousands, of miles of hauling over us. We have the quality, size and beauty if our fruit is allowed to mature before picking, properly selected and packed, and displayed before the buyer free from mold, or moisture, and with what is known as a postage rate of one dollar to the markets of the East, as some other fruits are hauled, the California fruit grower can meet all competition.

I have demonstrated to my own satisfaction that the best results can be obtained only through the precooling of the fruit, each individual package treated and cooled alike to the center or pit before loading in the car, precooled with *dry pure air*, removing all moisture from the fruit, so that it arrives at destination with no moisture perceptible. To reach this desired condition, I am satisfied that if so treated that an initial icing is sufficient to insure good delivery. (Applause.)

PRESIDENT JEFFREY. If there is no objection on the part of the convention we will now hear the report of the Committee on the President's Address: Mr. Rixford and Mr. Bishop were the members of that committee.

Mr. Bishop read the following report:

We, your committee appointed to consider the President's Annual Address to this convention, beg to report as follows:

We find the address prolific of thoughtful suggestions on important questions which are thus brought to the earnest consideration of the fruit growers of the State.

We would especially commend to your attention the suggestion that coöperative leagues or committees, such as the Citrus Protective League, be formed to consider the interests of each branch of the fruit industry, and to handle every proposition that has a general bearing on the particular branch it represents and in which all can rely in times of peril.

We indorse his idea that we are not confronted so much by the problem of overproduction as by that of underconsumption leading up to the stamping out of dishonest packing and standardizing the California pack as a business proposition, which he brings to our attention for the first time, and which must inevitably lead to further extension of the markets for choice fruit on its merits.

The President should be commended for the movement he has inaugurated recently, in holding community meetings of fruit growers in various places in the Sacramento Valley and which are in the months to come to be extended to other parts of the State, to consider the economic questions connected with the industry. It seems to your committee that these meetings will be productive of much good in threshing out various problems of especially local interest and leave them in a concentrated form for consideration on the broader plane of the State convention.

And we would earnestly call your special attention to his suggestions concerning the disapproval of the fraudulent land booming, hoping and believing it should receive the emphatic indorsement of every loyal Californian.

Finally, we commend to the convention a thoughtful consideration of the entire document as filled with timely suggestions for the good of the great industry in which we are all interested.

G. P. RIXFORD.
ROY K. BISHOP.

MR. BISHOP. The Citrus Protective League in southern California is a league in which the shipper pays so much for every car load of fruit he ships, and that money is used to gather information and protect us in the legislature and in congress. (Applause.)

Mr. Stephens moved the adoption of the report.

The motion was duly seconded, and, being put by Mr. Stephens, was unanimously carried.

PRESIDENT JEFFREY. I wish very briefly to thank the committee on the President's Address for the sentiment conveyed and for the beautiful language in which it is expressed.

MR. DARGITZ. Just one moment, before we get so far away that we forget it, a remark made in Mr. Kellogg's paper that it is facts and not theory that we are after. I am sure, as all practical growers, we recognize the great importance of facts, the practical knowledge that comes to us from the growing and handling of fruits, and I am sure every one of us who has looked into the subject very far will very greatly appreciate the theories that have come to us from the scientific side; and perhaps one of the greatest values that comes to the orchardist and fruit grower from these conventions is the fact that here the two extremes—one of practical knowledge and experience, and the other of the theoretical and scientific—meet and blend, and out of the two going forward we have the results that shall prove success for us. (Applause.)

PRESIDENT JEFFREY. The next topic for consideration will be "Grape Transportation and Storage." You all are acquainted with the work of Mr. Stubenrauch; you are personally acquainted with him, most of you, and you know him to be a most excellent and capable man. (Applause.)

MR. STUBENRAUCH. *Ladies and Gentlemen:* Contrary to my usual custom, I will read my paper. There are so many things to be said that I have formulated it in a paper.

GRAPE STORAGE AND TRANSPORTATION INVESTIGATIONS OF THE U. S. DEPARTMENT OF AGRICULTURE.

By A. V. STUBENRAUCH of Washington, D. C.

The grape storage and transportation investigations of the Bureau of Plant Industry of the United States Department of Agriculture, begun in California several years ago, form part of the Fruit Storage and Transportation Investigations of the Department carried on in different sections of the United States. These investigations include a complete study of the various problems connected with the handling of fruits in storage and transit—the two are practically the same, fruit in transit being simply held under storage conditions while being hauled across the continent. Naturally, there are many factors which have to be considered, but the investigations have narrowed down principally to a study of the relation of handling in picking, packing, and preparation for market to the occurrences of decay and deterioration in storage and transit. This part of the problem is fundamental, and it frequently happens that when once this is thoroughly understood, the other parts of the investigation are comparatively simple.

From all the Bureau work on this problem one fundamental principle has been deduced, a principle so important that frequently the only problem connected with the avoidance of troubles in storage or transit is an application of the principle to local practice.

It has been shown that the different kinds of molds which cause the most common forms of decay in fruits while in transit and in storage are unable to penetrate the sound, normal, skin of the fruit. These molds generally gain entrance through mechanical abrasions produced in the preparation of the fruit for market. It is not unusual to find 10 per cent of apples showing cuts or abrasions in the skin. Small fruits are more commonly injured, while oranges frequently show from 10 to 50 per cent of the fruit with the skin cut by the clippers in severing it from the trees or by rough handling of the fruit in the packing houses. It has been demonstrated that by careful handling in the picking and packing of oranges under commercial conditions the injuries can be overcome, and the decay can be almost wholly eliminated.

During the past four years the storage investigations have been extended to the table grape industry of California. These investigations were started with two main objects in view: A study of the factors which affect the keeping quality of grapes in transit and storage and the possibility of extending the markets and season of California grapes, ultimately with the hope of replacing the two million dollar importations of fresh Spanish grapes with the California-grown product held in common or cold storage. At present practically the entire Tokay grape crop has to be marketed within sixty days. Within a few years the output of this variety will nearly double. The necessity of either extending the season of marketing or of developing new markets becomes of vital importance.

COLD STORAGE EXPERIMENTS.

Our first efforts were directed toward the storage problems, and the results obtained in this work had a direct bearing on the transportation problems which were to follow later. A careful study of the behavior of a number of important grape varieties was begun. Some of these were grown commercially, some were not, and were included in the experiments to determine their suitability for introduction to commercial vineyards. The list of varieties includes the following, most of which were obtained from the University Experiment Station near Tulare, through the courtesy of the California station officials: Flame Tokay, Muscat, Mallaga, Thompson Seedless, Ferrara, Emperor, Verdal, Black Prince, Cornichon, Huasco, Bowood, Pizzutella, Perruno, Chasselas de Fontainebleau, Sabalskanski, and Almeria. Last year and the present season varieties from Lodi included the following: Flame Tokay, Emperor, Ferrara, Verdal, and Cornichon. This season a number of new varieties grown on the Government experimental vineyards at Fresno and Oakville were added to the list, but as this work is only begun these varieties need not be named here.

The preliminary work included a test of different methods of packing: In crates without filling, and in tight boxes with various filling materials in comparison with ground cork, such as is used with the Almeria grapes imported from Spain. The list of packing materials, besides the ground cork, included paper, both shredded and as a wrapper, wheat bran, corn meal, ground corn pith, shredded and cut tule and redwood sawdust. All of these substitutes, except redwood sawdust, have been found unsuitable and have been abandoned. Red-

wood sawdust has been further tested, and all of the results so far show that it is superior to the cork. The grapes packed in this sawdust hold longer and in better condition, and in future we shall probably confine our investigations of grape fillers to this material. It seems particularly fortunate that so valuable a substitute is at hand. It would be impracticable to use cork in this State on a large scale, both on account of its high price and comparative scarcity. It is evident that the importers of Spanish grapes are becoming aware of the superiority of redwood, as already inquiries are being made in the interest of foreign growers regarding the practicability of obtaining this sawdust in quantity.

It is impossible at this time to state the reason for the better holding qualities of the redwood sawdust. At first it was thought to be due to the greater fineness of the material, but a comparison of it with cork ground or shredded to the same degree of fineness as the sawdust, while it shows some difference in favor of the finer ground material, does not indicate that this is the only cause. So far, no attempt has been made to treat the sawdust in any way except to be sure that it was thoroughly dry. The material has been obtained from planing mills working on dried lumber, and consequently the dust has been rather fine. The use of this fine sawdust this season on a rather large scale shows that while the fine material holds the grapes in prime condition it has a distinct disadvantage in clinging tenaciously to the grape berries, especially around the pedicels and it is difficult to dislodge these fine particles without a strong air blast. It is, therefore, evident that before redwood sawdust can be used commercially it will have to be freed of the fine dust and splintery particles. Millmen assure us that this would be a comparatively simple and inexpensive process by using a fan, and it could be done at the mill without difficulty if the demand for the cleaned sawdust becomes great enough.

The flavor of the grapes packed in redwood has never been found to be tainted as long as the sawdust is pure. A slight mixture of pine or cedar, however, seems sufficient to flavor the grapes when held in storage for some length of time.

The storage investigations show that for long holding a filler will have to be used. All varieties with the exception of the Almeria, and possibly the Emperor, do not hold in first-class condition longer than thirty to forty days packed in crates, or too short a time, usually, for the holiday trade, which is the market offering the best demand for fancy grapes in good condition.

Table No. 1 shows the results of the cold storage experiments of last year (1908). The data are given in terms of the number of days after storing, when the fruit showed 5 per cent and 15 per cent deterioration, including decay, physiological breakdown, and shelling from the stems. These results were obtained by an actual determination of the percentages by weight, care being taken to segregate all the unsound berries. It is difficult to determine the exact commercial limit, because market conditions vary so widely in different sections and in different seasons. It is safe, however, to say that it will not pay to store anything but the very best and fanciest fruit, not only on account of the better keeping quality, but also because a relatively high price must be expected, and buyers are always more critical and particular when prices are high.

TABLE 1.

Results of Holding Table Grapes in Cold Storage (32 degrees). 1908.

	Packed in Commercial Crates.		Packed with Coarse Cork Filler.		Packed with Fine Cork Filler.		Packed with Redwood Sawdust.	
	5 Per Cent Deterioration After	15 Per Cent Deterioration After	5 Per Cent Deterioration After	15 Per Cent Deterioration After	5 Per Cent Deterioration After	15 Per Cent Deterioration After	5 Per Cent Deterioration After	15 Per Cent Deterioration After
Tulare varieties:	*Days.*	*Days.*	*Days*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*
Almeria (Ojanez)	70	110	105	121	120	175	155	250
Cornichon			80	92	70	95	85	125
Ferrara	35	45	80	100	80	105		
Flame Tokay			45	60	55	80		
Huasco					60	75	90	105
Malaga			80	100	60	85	80	105
Perruno	45	50	50	75	60	90	80	110
Pizzutella—								
Early picking	40	60	55	70	55	75		
Late picking	20	40			50	65	65	90
Verdal	5	15	65	90	60	90	45	80
Muscat	30	65	55	75	60	70	75	100
Lodi varieties:								
Cornichon					75	100		
Emperor	35	60	55	65	80	105	120	180
Ferrera					75	85		
Flame Tokay—								
Sandy soil					55	65		
Flame Tokay—								
Sandy soil, late picking					30	45		
Flame Tokay—								
Sandy soil, late picking					40	55		
Flame Tokay—								
Black lands, late picking					70	85		
Verdal					60	90		

The limits given in the table are more or less arbitrary, but the experience gained in the four seasons' investigations show them to be both fair and conservative. It has been found from the examination of a very large number of grape packages that up to 5 per cent deterioration would be considered commercially sound, and decay to this extent would not be noticed on the market unless it is all at or near the top of the package. Between 5 per cent and 10 per cent would be noticeable and would detract from the market value of the fruit, while 15 per cent or over could hardly be disposed of except at a heavy discount. The 15 per cent date is, therefore, given as the extreme limit of the marketableness of the fruit. The range of days between the 5 per cent and 15 per cent limits gives a very good idea of the rate of deterioration, which varies considerably with different varieties and with different packing materials. As a general rule, the range is shortest in the crates without a filler and greatest in the redwood sawdust packs.

The grapes were picked when their appearance indicated full maturity without overripeness, and this naturally differs with different varieties. It is difficult to determine the exact time when grapes are ripe. In our experiments color, sweetness, and firmness were used as the

determining factors. Experiments with green and overripe fruit show that both will not hold long or in good condition; the former shrivel badly and shell from the stems, while the latter soon decay or break down physiologically. One comparison of early and late picking is shown in the table: Pizzutella, early picked (Sept. 16), remained in good condition forty days in crates, while the same variety picked two weeks later held only twenty days to the 5 per cent limit.

The fruit was all very carefully handled and was nearly all packed by ourselves. Great care was used in culling to eliminate all unsound or injured berries, and the packing was done carefully to avoid injury in handling. Packing was done as quickly as possible after picking and the packages were gotten into the cold storage rooms with the least possible delay. Not more than thirty-six hours elapsed between picking and placing the fruit in cold storage.

It has been shown in the investigations with other fruits that one of the most important factors in the successful handling of fruits, either in storage or in transit, is quick shipment or quick cooling after the fruit is harvested. The sooner the fruit can be cooled after it leaves the tree or vine the longer time it will continue in first-class condition. This is especially true where there are any appreciable mechanical injuries in handling. It has been shown with oranges, for example, that after a delay in shipping or cooling of two to four days the decay in transit may be from two to five times greater than under immediate shipment or cooling, depending upon the amount of mechanical injury in the fruit. These factors of quick shipment and quick cooling are found to be even more important in the case of table grapes than they are with oranges, for the reason that the ordinary grape package offers ideal moisture conditions for the development of molds, and if the proper heat conditions are present molds are almost sure to occur. When a filler is used quick cooling is just as important, if not more important. The filler acts, to a certain extent, as an insulation, and cooling will be relatively slow under the best conditions. The converse is also true, and consequently the fruit should be packed as cool as possible. A very appreciable effect can be gained in this respect by taking advantage of natural cooling overnight, and where picking is done in warm weather it is always best to allow the grapes to remain open over night and pack the next day while cool. We had a good illustration of the deleterious effects of warm packing and delay in cooling during the present season. A number of varieties, packed at Fresno at a high temperature, were in some way delayed several days by the express company in transit from Fresno to the point where they were stored. The first inspection of these lots made a few days ago showed every one long past the 15 per cent limit, while a few packages of the same variety stored locally and quickly cooled are still in first-class condition.

The question has been asked whether grape storage will ever become a commercial business. We believe it will, and plans are being considered by the Bureau to extend the investigations along commercial lines, and some of the grape growers of the State also are planning to make a commercial test next season. In the carrying out of these investigations, nothing has been done which can not be done under commercial conditions. The problem connected with the proper con-

dition of the sawdust and its preparation for use will be investigated. The one great governing factor will be the introduction of these grapes into the markets. Just how this can be done remains to be worked out.

Quite an appreciable local market has been developed for cold storage grapes in southern California. The fruit is hauled to the storage rooms direct from the vineyards and held loosely in small field boxes. The growers have learned to handle carefully in picking and culling, and the grapes are placed in storage as soon after leaving the vine as possible. The varieties used are Flame Tokays, Muscat, Malaga, Emperor, Verdal, and Ferrara. The first two are held in nice condition for Thanksgiving and the rest for the Christmas market.

I can not close this discussion of the results of the cold storage experiments without calling special attention to the Almeria, or more properly Ojanez, which is the variety mainly shipped from Spain packed in cork. We have been able to obtain small quantities of this variety from the Tulare Station and the results have been most encouraging. A glance at the table shows how far superior this variety is for holding than any we have had under observation. It seems especially fitted for this purpose, and it is a pity that it has not been successfully grown commercially in California. It seems that the variety was given a wide trial years ago with uniformly poor results, due, we now have reason to assume, to the fact that proper treatment was not given it. The vines have to be long pruned and possibly may need trellising in this State. The fruit has such splendid shipping and keeping qualities that a systematic and thorough study of its cultural requirements in California is well worthy of attention.

TRANSPORTATION INVESTIGATIONS.

These investigations were begun at Lodi last year (1908) and were continued during the grape shipping season just closed. The work consisted mainly in the study of the relation of handling in picking, packing, and shipping to the occurrence of decay and deterioration of table grapes in transit from California to Eastern markets. For several years considerable loss from decay has resulted in the shipments of Flame Tokay grapes from Lodi, and it was at the urgent request of the grape growers and shippers of that section that the Bureau investigations were undertaken. When we began work at Lodi we had no theory other than the general principle worked out in the case of other fruits and in California grapes in storage: That the common molds, which are the cause of the ordinary forms of decay of fruit in transit and storage, have not the power to penetrate the sound normal skin of the fruit. As mentioned in the storage investigations above, it has been found that the molds gain entrance through mechanical abrasions made in the skin of the fruit in preparing it for market, and that if the skin can be maintained in sound condition the ordinary decay will be prevented.

The plan of the work consisted in forwarding a number of crates and boxes of grapes, packed under known conditions, through to New York, where one of the Bureau staff received the fruit and carefully inspected it. This inspection consisted in cutting apart all bunches and segregating the decayed and injured berries and determining the actual percentages by weight on the day of arrival, and three, five, and seven

days after arrival. Last year twenty-two shipments were made. This year thirty shipments were put through. In each car there was an experimental series consisting of eight crates or boxes: two were the ordinary commercial pack, two were a careful commercial pack put up either by ourselves or a careful packer working under our supervision. In this careful pack we attempted to do nothing more than to be sure that the bunches were carefully culled and placed in the baskets without further injury. All the careful packs were put up in two-basket crates. Along with these crates were two boxes each of the same fruit packed in ground cork and redwood sawdust. One crate or box of each pack was placed on the bottom tier of the car and one of each on the top tier. In each car, therefore, we had the same fruit handled in different ways, thus eliminating all factors except the handling. This year we have obtained data on the equivalent of about 250 crates, or sufficient to place the work on a practical basis.

TABLE 2.

Average Percentages of Decay in Shipments of Tokay Grapes from Lodi to New York. September and October, 1909.

	Commercial Pack Crates.	Careful Pack Crates.	Packed in Ground Cork Boxes.	Packed in Redwood Sawdust Boxes.
On arrival—				
Bottom tier	4.06	0.85	0.79	0.33
Top tier	7.51	1.63	2.11	0.31
Average	5.78	1.24	1.45	0.32
Three days after arrival—				
Bottom tier	8.96	1.95	2.95	0.62
Top tier	11.62	4.51	2.40	0.75
Average	10.29	3.23	2.68	0.69
Five days after arrival—				
Bottom tier	12.68	3.67	4.94	0.81
Top tier	18.88	8.73	4.36	0.82
Average	15.78	6.20	4.65	0.81
Seven days after arrival—				
Bottom tier	18.66	6.53	5.75	1.03
Top tier	21.78	13.35	5.70	1.37
Average	20.22	9.94	5.73	1.20

In Table 2 and accompanying chart the data from all the shipments have been brought together and show the actual percentages of decay found in the different lots on arrival and up to a week later, the fruit being held under open market conditions. These data show a wide difference between the commercially packed and the carefully packed crates and between the bottom and top tiers in the cars. The average on arrival in the commercial crates was 4.06 per cent on the bottom tier and .85 per cent in the careful pack at the same place in the car. On the top tier the figures are 7.51 per cent and 1.63 per cent, respectively. These differences were maintained during the time the fruit was held. Three days after arrival the commercial pack showed 8.96 per cent on the bottom tier and 11.62 per cent on the top. The figures

for the careful pack at the same time are 1.95 per cent and 4.51 per cent. Five days after arrival we have 12.68 per cent and 18.88 per cent for the bottom and top tiers in the commercial pack and 3.67 per cent and 8.73 per cent for the careful pack, respectfully. Seven days after arrival the commercial pack had increased to 18.66 per cent on the bottom tier and 21.78 per cent on the top tier, while the careful pack had reached only 6.53 per cent and 13.35 per cent, respectfully. The effect of careful handling shows in the fruit after it reaches the Eastern market, and this is an important factor when the possibility of extending the markets for California grapes are considered. The carefully handled lots only slightly exceeded the commercial limit of soundness five days after arrival while the commercially packed crates were just at the limit or a little above on the day of arrival. Fruit in the one case could be reshipped to smaller markets in less than car load lots, while in the other case it would have to be used quickly. These figures show the same relationship as those found in the season of 1908 and we may be sure that the differences are due wholly to the handling. We have eliminated the other factors by taking fruit from different sections of the district and extending the shipments through the whole season.

An examination of the decayed or moldy berries cut from the various lots shows that fully 95 per cent of the decay started at the pedicel or point where the stem and berry join. This is the weakest point of the grape berry and the slightest crack or loosening at that place will allow the mold spores to gain entrance and start the decay. With the larger fruits it is comparatively easy to detect injuries and to eliminate them; grapes are not only more easily injured but the injuries are more difficult to detect. The necessity for care in handling grapes becomes therefore doubly important, not only in the packing, but in the picking and all handling operations. The handling should be reduced to a minimum, for every time a bunch of grapes is lifted there is liability to injury unless it is done with the utmost care.

It will occur to some that grapes grown under different conditions (soil or otherwise) or from young vines, will vary much in their keeping quality. This is undoubtedly true. Our records, however, are based on shipments made from sandy soil vineyards, from heavy soil vineyards and from old and young vines, and all are included in the tables. We have eliminated to a large extent the effect of these factors. Where fruit is tender and more liable to injury, it must be all the more carefully handled. We have had some lots from old vines show more decay than younger and some heavy land fruit show heavier decay than corresponding lots from sandy soils. Moreover, in our carefully handled series and cork and sawdust packs we have used the same fruit and thus are able to show that even the weaker fruits, carefully handled and uninjured will not decay, other things being the same.

So far we have not referred to the results obtained from the cork and sawdust packs. These were used as a check to determine whether grapes could be handled, packed and shipped in good condition. A glance at the tables and charts shows how well the fruit carried. An average of all the lots packed in cork shows 1.45 per cent decay on arrival and 2.68 per cent, 4.65 per cent, and 5.73 per cent, respectively, three, five and seven days after arrival in New York. The lots packed in redwood sawdust showed much less decay, being only .32 per cent

on arrival and .69 per cent, .81 per cent, and 1.20 per cent three, five and seven days after arrival, respectively. Why not change the method of packing? will at once suggest itself to some. But this is not to be recommended until every other means to get the fruit through in sound condition has been exhausted. We believe that the results of our carefully handled shipments show that fruit can be gotten to market in sound condition packed in crates. The markets are accustomed to receiving California grapes in crates and any attempt to change the package or method of packing on a large scale will result in serious objection on the part of the buyers.

We have had one example and warning of this during the season just closed in the way that the general use of the 2-basket crate has been objected to in the Eastern markets. These objections are likely to continue and if the markets insist on a 4-basket package the grapes will have to be packed in that way. It is claimed, and perhaps rightfully, that the 2-basket packs arrived in no better condition than those packed in 4-baskets, and that, besides, the 2-basket packs often were more loosely put up and did not look so well on arrival. We have had a number of 2-basket packs under observation and in many of them we have found as many injured berries and as much decay as in some of the 4-basket packages. The use of the large basket will not of itself correct the trouble, and unless the packer does her share, there is no advantage. However, it can not be doubted that it is easier to pack in the large baskets and there is less liability to break or injure the berries. The packer has a better chance to do good work, and do it more quickly than she has with the 4-baskets; but if she uses care, she can get the grapes into the smaller baskets without serious damage. She will have to be given more time and consequently must not be expected to put up so many crates a day.

A comparison was made in a few shipments of commercially packed 4-basket and 2-basket crates, with the following results: 4-basket crates, 11.30 per cent decay; 2-basket crates, 8.50 per cent decay, on arrival at New York.

These figures show less decay in the 2-basket packages, but both are beyond a reasonable commercial limit on arrival. As in the case of grapes in storage, we have placed 5 per cent as a reasonable commercial limit on arrival. Up to 5 per cent would be considered sound. Above 5 per cent and up to 10 per cent would be noticeable, and above 10 per cent would be fit for only immediate use. More than 15 per cent would not be salable except at a heavy discount.

Table 3 and corresponding chart show the percentages of decay resulting from injuries and the percentages of injured berries found in a number of commercial packs obtained from different growers and held in Lodi in an iced car for about two weeks or the equivalent of a trip across the continent.

TABLE 3.

Average Percentage of Decay from Injuries and Percentages of Injured Berries in Commercial Crates Held in Iced Car at Lodi Same Length of Time as Transcontinental Trip.

	Decay, per cent.	Injuries, per cent.
First day	9.02	12.82
Third day	18.53	8.68
Fifth day	23.52	7.15
Seventh day	29.62	4.21

It will be noticed that the decay and injuries are both high. These crates were not selected with any view to obtaining both carefully and carelessly handled packs. There were perhaps more from packers handling rather carelessly. The figures show strikingly the relation between injuries and decay.

If the percentages of decay and injuries are added together, the figures show from 22 per cent to 34 per cent of the fruit was injured in handling and rendered susceptible to decay. The first day the crates were taken from the car 9.02 per cent was found decayed and in addition 12.82 per cent was injured. At the inspection on the third, fifth and seventh days after taking from the car the decay increased at a tremendous rate, and there was a corresponding decrease in the percentages of injured berries not decayed. This has a very important bearing on the holding qualities of the grapes after arrival, and emphasizes strongly the necessity for preserving the natural resisting properties of the fruit.

It naturally follows that it will cost more to handle carefully—just how much more it is impossible to say, but it will vary with the quality of fruit and the season. But will it pay? many will ask. During a season of low prices, at first sight it may seem unreasonable to advocate the spending of more money on packing. That careful handling will pay, and pay well, has been demonstrated again and again in the orange business. We have seen a number of associations and individuals rise from among the lowest priced class to the highest priced class as soon as more care was used in handling, thereby reducing the susceptibility of their fruit to rot. By increasing the cost of handling a few cents per box, thus insuring sound fruit, has in some cases increased the average returns from 25 to 50 cents per box, leaving out of consideration the value of the reputation thus gained. The question now in the citrus business is not how cheaply can the work be done but how well. It has been recognized that cheapness places a premium on careless work. What is true of citrus fruits will be found equally true with grapes. And if the grape business ever gets to the point where the difference of a few cents per crate spent in good handling becomes the margin of profit or loss, it will cease to be a safe business investment.

The best answer to the question of whether careful handling is practicable or profitable is shown by the fact that a number of growers are handling carefully and are getting good results. When the marketing problems have been systematized, much better results will follow.

Table 4 shows the percentage of decay in individual shipments, arranged in the order of the percentages of decay shown on arrival in the commercial packs. These are the individual shipments from which the general averages have been made. The range is very great, running from less than 1 per cent to over 13 per cent. One shipment went to 24.83 per cent, but this was packed after a rain and most of this loss was due to soft decay, starting on sound berries. The figures shown in No. 6, 3.75 per cent, were obtained from a shipment made from the same place previous to the rains. All the other high percentages were obtained from shipments made before the rain. The percentages of decay in the carefully handled lots of the same fruit placed alongside show that even in the case of the heavy decay found after the rain the carefully handled lot showed less than 2 per cent, or far below the com-

mercial limit above mentioned. This was accomplished by extra care in culling and elimination of all bunches showing excessive decay when picked. These were frequently found to be the tight bunches, and they were always cut apart to determine whether there were any decayed berries hidden in the middle of the bunch.

TABLE 4.

Percentages of Decay in Individual Shipments on Arrival in New York.

	Commercial Pack Crates.	Careful Pack Crates	Packed in Cork Boxes.	Packed in Redwood Sawdust Boxes.
1	0.90	0.17	0.02	0.00
2	1.80	0.70	0.72	0.07
3	2.52	0.50	.....	0.10
4	3.18	0.28	0.18	0.10
5	3.52	1.00	0.10	0.05
6	3.75	1.05	.....	0.11
6 (after rain)	24.83	1.92	.....	.....
7	5.66	1.33	0.55	0.50
8	6.50	2.41	4.94	0.77
9	9.42	2.05	2.38	0.75
10	13.32	1.95	1.25	1.20

Table 5 and chart show the percentages of decay found on the bottom and top tiers in commercial crates put up by careful packers compared with the commercial pack of packers handling rather carelessly. The figures show that where there is less susceptibility to decay there is not so wide a difference between the bottom and top tiers. The figures for the careful packers are 1.33 per cent on the bottom and 1.84 on the top, while the careless packs show 6.73 per cent on the bottom and 12.10 per cent on the top, or nearly double. These differences are maintained throughout the time the fruit was held, and the rate of increase in the careless packs is very much greater than in the carefully packed crates. These figures were obtained from ordinary crates selected at random from the commercial shipments, and show conclusively the wide variation between good and poor work. When these figures were first shown to one of the shippers at Lodi he at once implored us not to emphasize the difference between the bottom and top tiers too strongly, as he stated he was already having difficulty with some growers who objected to having their fruit placed on the top tiers. The best way to overcome this objection would be to get all the growers into the careful class and then the difference between bottom and top will be reduced to a minimum.

TABLE 5.

Percentages of Decay in Commercial Crates of Tokay Grapes Packed by Careful and Careless Packers. Shipments from Lodi to New York, 1909.

	Commercial Crates by Careful Packers.		Commercial Crates by Careless Packers.	
	Bottom Tier.	Top Tier.	Bottom Tier.	Top Tier.
On arrival	1.33	1.84	6.73	12.10
Three days after arrival	2.21	4.83	10.48	17.28
Five days after arrival	4.33	7.05	14.25	28.93
Seven days after arrival	7.33	9.33	25.18	35.15

The shipping experiments conducted at Lodi were accompanied by a series of local demonstrations, in order that the growers might be able to see the results of the work. A refrigerator car was held at Lodi and kept fully iced during the shipping season. A duplicate of every series shipped to New York was placed in the car and held there until the shipment arrived at destination. The lots were then taken out and placed on exhibition, and the growers were thus enabled to observe the differences found in the different packs. Along with these a number of growers contributed crates from their commercial packs, in order to be able to judge of their appearance on arrival and in some instances to determine the kind of work their packers were doing. This campaign of education among the workers has resulted in a marked general improvement in the commercial pack of the district during the season just closed when compared with the season of 1908. The first year that the work was carried on it was not uncommon to find a large part of the decay due to crushed berries on the top of the pack made in pressing on the cover. During the last season this difficulty was largely overcome by using more care in nailing on the covers and by extra cleating.

Our investigations during the past season show that there is at least one mold which has the power, under certain conditions, to penetrate the unbroken skin of the grape berry. This is a species of *Botrytis*, probably *B. cinera*, and is undoubtedly the cause of the so-called "slip-skin" found after the rains. The "slip-skin" is the early stage of the decay, and unless *every* berry showing this is culled out it will decay, no matter how careful the handling may be done. This disease gives very little trouble before the rains come, but after a rain the crops of many vineyards are practically ruined by it. It is wholly distinct from the cracking of the berries.

It is easy to see that if there were few or no spores of the *Botrytis* when the rain comes, there would be little or no trouble from this decay. This is a pathological problem, and points to the control of the fungus in the vineyard either by spraying or some other remedial treatment of the vines. The life history of this fungus on the vine has not been fully investigated and until it is, it will be impossible to state the exact means for its control. This is a most important phase of the problem, and if the work of the Bureau is continued in California we hope to have a complete pathological study included in the investigations.

In conclusion, it may be stated that the results obtained during the past two seasons are very encouraging. The relation between handling and the occurrence of decay is as striking and consistent as the results of the orange investigations in southern California, which have led to the practical elimination of decay in transit. The indications are that by careful handling in packing, accompanied by some method of quick shipment or cooling, the present losses from decay may be largely avoided. (Applause.)

MR. RIXFORD. I would like to ask the Professor a question. He refers to an importation of the Almeria grape for distribution a good many years ago. I think I was the introducer, about twenty-five years ago. I had a large shipment distributed throughout the State? Do you know how it turns out as a producer?

MR. STUBENRAUCH. We had it under observation at Tulare and packed at that place for five years, including this season. For four years the crops were very good, but this last season the crop was not so good; but the way the vines bore at that place I should say it was a commercial possibility to have good crops, depending on the way they were pruned. I think the only way to find that out is to have a number of experimental plots in different sections and to actually study the method of handling that grape in California. We could establish experimental plots in different sections and have the pruning and other cultural requirements studied in that way, and I am hoping to have the Government take that up. I think it is so important, because there isn't anything like it; we have nothing like that grape under our observation. I think if we had that grape growing in California we could get that splendid trade.

MR. RIXFORD. R. B. Flowers, to whom I sent the cutting, grafted them into other varieties, and he reported them as shy bearers.

MR. STUBENRAUCH. As near as I can find out, it was a very shy bearer, but they had been pruning them in the old way, and, of course, probably they won't grow in every section. It is a late grape, comes along with the Emperor and even later, but it is certainly worthy of a very careful study.

A MEMBER. Where can we get cuttings?

MR. STUBENRAUCH. I think the station at Tulare has been abandoned, but another plot has been established at Fresno.

MR. ASHLEY. You can get some from Frank Swett.

MR. STUBENRAUCH. Yes, and George Roeding has a few.

MR. HARTRANFT. I live in a very late district, and we are still hauling in grapes. You say it is a very late grape, and probably in such a late district, on the north slopes of some hills where the shadow comes about half-past one or two o'clock in the afternoon, I think perhaps it might be well to try them out.

MR. STUBENRAUCH. But try the long pruning and trellising.

MR. WALTON. In your remarks you said there seemed to be no way of determining when grapes were ripe and ready to pack and ship. Is it not possible chemically or some way to determine when grapes are ripe? I notice in the East, when grapes are received there, the market is destroyed by immature shipments in each variety.

MR. STUBENRAUCH. You might determine the percentage of sugar but that does not really tell you when the grape is ripe; it only tells you how sweet it is. I think the only way to get at that point would be to make a number of experiments, taking the grapes from the vines at different stages of maturity, starting purposely with green grapes, taking their sugar content and then continuing from week to week or from day to day, even, but that would not give you the actual time the grapes were ripe but would give you the most favorable percentage of sugar. It is especially hard to say that this grape is ripe. Color, for instance, can not be relied upon to determine that point. We have the Tokay at Tulare very, very poorly colored, yet the percentage of sugar was high enough.

MR. ASHLEY. That would vary greatly in a few miles. For instance, in the Lodi country the black land is three or four weeks behind the sandy land, only three or four miles apart.

MR. STUBENRAUCH. Oh, yes, it would vary in short distances. That would have to be worked out in typical localities. I think that is an important point. I was speaking with Mr. McKevitt about that last night. If we had some definite figures to fall back on I think we would be able to hold back shippers to a large extent and probably prevent the shipping out of that green fruit. I have seen some of the green grapes shipped and they are absolutely worthless. In the Imperial section they grow the Marquette and it ripens six weeks ahead of anything in the San Joaquin Valley. They are not satisfied with that and want to pack two weeks earlier. You might as well eat vinegar as that fruit.

MR. STEPHENS. The expression of "top tiers," what do you mean?

MR. STUBENRAUCH. In the car. The grapes are shipped loaded nine high. The bottom tier refers to the floor and the other, the ninth one, on top. That is the way it was done.

MR. STEPHENS. That is very important, because if the tonnage should be raised it would naturally raise the tiers and consequently the top tiers would be more affected than the bottom tiers.

MR. STUBENRAUCH. Yes, depending on the installation of the car. If you could start with cold fruit you won't have so much trouble. That was shown in the orange work in southern California. We were able to load three tiers in the car and not hurting the fruit at all, by starting with cold fruit. We put 549 boxes in some of those cars by putting in three tiers.

PRESIDENT JEFFREY. Now we will hear from Mr. Brown, of the University, who will present a paper, "The Horticultural Work at the University Farm, its Aims and Objects." Mr. Brown is Professor Clarke's assistant in horticulture at the University Farm.

THE HORTICULTURAL WORK AT THE UNIVERSITY FARM.

By B. S. Brown, University Farm.

Before taking up the discussion of the horticultural work at the University Farm, it would seem best to spend a few minutes in explaining just what this farm is, and some of its more general attributes.

The farm proper consists of 780 acres of land and is situated in the town of Davis, thirteen miles west of Sacramento. All of this land is subject to irrigation, and its splendid fertility affords an excellent opportunity to carry on all kinds of farm operations or experiments. The purpose of this farm can, perhaps, be best explained by quoting a part of the statutes establishing it. In the acts of the California legislature of 1905, chapter CXXIX (129), reads in part as follows: "The University Farm and the instruction thereon shall be so conducted as to meet the needs of persons who desire instruction in agriculture, horticulture, viticulture, animal industry, dairying, irrigation and poultry raising, and to prepare them for the pursuit thereof; and shall be used for experimental and investigational work in connection with the Agricultural Experiment Station of the University of California. Short courses of instruction shall also be arranged for in each of the leading branches of agricultural industry, so regulated as to pro-

vide for popular attendance and general instruction in agricultural practice."

From the above it will be seen that the main objects of the farm are: first, to carry on investigational work, and second, to provide instruction in various agricultural subjects.

To turn now to the horticultural phase of the work at the University Farm, let us first consider the educational side. For some years past in this State there has been an ever growing feeling among the farming class that the long period of years required by the University for an agricultural education could not serve their best interests. The four years in the high school followed by the four years in college was too long a time to keep the young man away from the farm, besides creating in him a desire to remain away. To avoid this, a three-year course, for which a high school training is not necessary, has been established at the farm, which aims to give the boy a thorough training in agriculture. At present this school is in but the second year of its work, and although many rough places still remain to be smoothed out, yet on the whole results are very encouraging. In horticulture the work so far has been confined to tree fruits. But in this we have tried to give the boys a thorough working knowledge of the subject, such as the selection of sites and soils for the various fruits, preparation and planting of the young trees, the various cultural methods necessary, irrigation, etc. Pruning in its various phases is taken up. The harvesting and handling of fruit is carefully considered, and the various marketing processes are followed until the goods are in the hands of the consumer. Each boy is instructed in the work of the nursery. He is taught how to propagate orchard trees, and the actual work of budding and grafting is done until the hands have been trained to do what the mind has been taught to understand.

Another feature of the educational work at the farm is the short course in horticulture. We now have under construction a $20,000 horticultural building. When this is completed we will have abundant facilities to offer short courses in this subject. These are primarily for the busy farmer. One who can spare but two or three weeks from his work. Here he gets in touch with other people and sees what they are doing. He is able to follow the experiments carried on by the farm, all of which help him to keep up to date. Problems and troubles of the farmer are discussed and remedies suggested, and instruction in the more general problems are given by the men from the University. With our new equipment, together with the hearty coöperation of the people of the State, we hope that much good will result from these short courses.

Turning now to the investigational phase of the work, which, I presume, to you people is the more interesting, let us see what the University Farm is doing to help solve the problems of the agriculturist. How can the farm benefit those who have passed beyond the time and reach of the high school or college? California is a big state, and farming in it is done under more varying conditions than any other state in the Union. Our climate varies from that of the tropics in the south to perpetual snow in the north. Our moisture conditions vary from those of the barren desert to that of almost continual rain. It is very apparent, then, that under these many different conditions that

advice that would hold for one section of the State would probably be inapplicable for another. Hence, the need of the various experiment stations. California, more, perhaps than any other state, has an unlimited field for research work. So many new things to be tried, so many problems to be solved that at present our answers to questions are few and far from satisfactory. The University Farm, as best it can, is trying to fit into the conditions of the great Sacramento Valley. A great fertile country, larger than many of the Eastern States, capable of supporting more than twenty times its present population, yet but little known or understood.

At the present time the horticultural department has a number of experiments under way; twenty acres have already been planted to standard varieties of deciduous fruit. Among these we have 12 varieties of almonds, 6 of pears, 12 of apples, 18 of plums, 5 of prunes, 5 of cherries, 9 of apricots, and 80 of peaches. These are all to be tested out under valley conditions. Their amenability to different treatments of pruning, of methods of culture, and of irrigation are to be watched, that we may give more specific answers to the many inquiries.

One of the special problems which is now being studied is that of the almond. In many sections of the valley this particular crop is a failure, and no one seems to know why. Some say it is due to early blossoming and frost, other to the lack of cross-pollenization, etc. We are trying by the application of scientific methods to find a cause. We need to watch the flowers of these trees to see if they are perfect, we need to examine the pollen to find out if it is carried by wind of by insects, and if by insects, what particular one is responsible. We need to know the length of time these flowers are open, and their susceptibility to temperature and moisture. We must find out if they are self-fertile, or if they must receive pollen from another tree, as many other plants do. We must also find out whether they will grow best upon their own root or upon their near relatives, the peach, plum, or apricot. And if there is a difference, to what soil each particular root is adapted. All of these questions and many more we are now asking of the almond tree. I simply mention these to indicate what the plant men of the experiment station are supposed to know.

Along these same lines Professor Bioletti is carrying on experiments with the grapes. He has twenty acres which he is preparing to turn into an experimental vineyard. All of the different types of table and wine grapes are being grown to determine their suitability to valley conditions. Different varieties of the European grapes are being grafted on to the many different species of the native stock to see if they will make a good union and strong, vigorous plant. At the same time a careful watch is kept for their resistance to phylloxera and attacks of mildew. At present about 20,000 grafts are being made, dealings with fifty different varieties of grapes on twelve or fifteen different kinds of roots.

This outlines in a very brief way the horticultural conditions as they exist at present at the University Farm. As we look over the conditions of the valley and plan for future work, we find an almost unlimited field. For example, take the apple. It doesn't do well in the valley, and to the many questions why, our answers are far from satisfactory. The high summer temperature forces the fruit to early

maturity. The fine apple flavor does not develop and their keeping qualities are impaired. We need a good apple for the Sacramento Valley. Not only one good to the taste, but also of good keeping and shipping qualities. We hope to do something with this by a series of experiments lasting perhaps ten years.

Just now word comes to us that the olive men are in trouble. The pure food law prevents them from using artificial coloring in pickling, and the many-shaded product now put on the market is spoiling the trade. We need to help these people out by producing an olive with less bitter and a more uniform coloring, that the California product may compete with that of Europe on the open market.

Further, we believe it a part of experiment station's work to try out all the new varieties of fruit offered by the various nursery companies that we may be able to advise of their adaptability to valley conditions, as well as to protect the farmers from fakers. New plants from other states or countries should be tried by the experiment station, and records kept of their probable value. Novelties and tropical plants, such as the vanilla bean, tea, coffee, tobacco, and cotton, which at present have no commercial value with us, should be tried out, if for no other reason than that we may be able to properly answer the questions of those seeking information.

Still further, owing to the lack of a forestry department at the University, the horticultural department at Davis is experimenting with eucalyptus. A few hundred trees are being tried out in connection with our sewage disposal plant, and also of a few variety tests are being made. Of course, we can but inadequately meet these requirements, but it seems that a subject carrying such a widespread interest throughout the State as eucalyptus does should be officially represented by the University, and we believe that it is not too much to hope that in the near future the University Farm will have a department of forestry to represent the State's leading commercial industry.

From the educational side at the University Farm, we are predicting great things for the future students in horticulture. Instead of the one-year course in pomology we hope to offer four courses, with as many more in allied branches of horticulture. At the present time the successful orchardist must know how to spray, so we must introduce a course to cover this need. Bush fruits offer a new field for the Sacramento Valley farmer. So our school schedule ought to be enlarged to include these. Floriculture needs to be given, that the coming farmer may know how to grow, to care for, and appreciate the beautiful flowers for which California is famous. In these days of country-life commissions and agricultural high schools, rural art and home decoration must be brought in prominence that *real homes* may be built and their occupants made contented by the knowledge that they have the best there is.

The efforts in horticulture at the farm should not be devoted altogether to question of production. Although the producing of bigger fruits, of finer quality and flavor is important, yet we believe that it is just as important to know that this same fruit is placed in the hands of the consumer in a clean, wholesome condition. We believe in organization among the farming class, and we think the young student should be trained along these lines in school, so that when he gets out and

comes in contact with the actual problems of life he will have the equipment and training necessary to become a leader.

We might continue to add to this list, but this will suffice to show the responsibilities the University Farm has undertaken. Whether it will prove a success or not rests largely with the ones who patronize it and the support of the people of the State. We believe that the University Farm has a great opportunity before it, and we hope that it will get your hearty coöperation and that the agricultural education of California may be brought up to the standard to which it deserves. (Applause.)

PRESIDENT JEFFREY. I would like to call attention to one particular part of Mr. Brown's address for you to consider, that is, the reference to the economical part of it. When I was over at the University Farm a few weeks ago talking to these same boys, of which Mr. Volck is a sample of what they turn out from the higher department of the University agricultural school. I asked those boys if they knew how far the Southern Pacific Railroad Company had to lift a car load of peaches to get it to market. I didn't expect them to answer it: there isn't a man in the house can answer it, but the boys had never thought of that question. In taking a car load of sugar from New Orleans to Chicago they have to lift it 200 or 300 feet. In taking a car load of peaches from California to Chicago they have to lift it 7.3 miles straight up. Now, that is a matter of economics, and is very important. Fifteen years ago the average freight train was hauling only 143 tons of freight. To-day the same crew of men, so many brakemen, conductor, engineer and fireman, are handling nearly 400 tons of freight. The first proposition I named is in favor of the railroads. They can't carry freight 2,300 miles and lift it 7.3 miles as cheaply as they can carry it a few hundred miles and lift it 300 feet. On the other hand, the railroad that is now able to carry 400 tons of freight with the same crew of men that formerly could only carry 143 tons should reduce their rates. That is in favor of the fruit grower. I asked the boys of they knew that the producer of a perishable product had to take all the risk of taking it to the market, whether he sold the crop on his trees or whether he sold it on consignment or in what way. The boys had no thought of that. It is a good thing for all of us to think of. Now, what I object to in the University course at Davis and also at the University itself is, that they have no chair of agricultural economics. They have an economic department there, and each one of seven or eight professors there signs after his name, "Professor of Commerce," and the word "commerce" means to the average person the mere handling and shipping and traffic in freights. You go to a commercial school in any city in this State and you will see them doing all their figuring and warehousing and banking and insurance and brokerage, but they don't do any figuring in selling hay or peaches. They teach the boys at the school what they call commercial subjects. It is no more commercial than Mr. Judd's selling his apples. I have talked this over with Professor Wickson. He agrees with me that the University should have a chair of farm economics, and when you people realize this you will get it. I think the University ought to give it to you without any demand. Professor Wickson says it will come when the farmers demand it. When you send your boys to be educated

as farmers, see where they are denied the right to learn how to sell the products they raise. We have too long considered farming as a mere function, as a mere occupation, that is, the producing of a certain tonnage of fruit and we have forgotten to teach the farmers that there is a business end of it. As I told the boys at that meeting at Davis, the business part of farming may be entirely different from the productive part. So is my right hand different from my left. Will any one in this room deny that I need both of those hands? Sometimes my very life may be dependent on my having two hands. They are different; one is right and the other is left. Just as selling farm produce differs from raising it, and yet I must have both of those if I am to make a success. I believe the very life of farming will soon come to the point where the farmer must be as good a business man as he is a producer. I believe we will come to the point very soon that the man who shall teach another man how to raise more fruit without teaching him how to sell it is a disadvantage to the State. In other words, the University must come to the point of teaching the boys just as thoroughly how to sell the products as they do to raise them. The Southern Pacific Railroad knows everything about fruit growing that relates to railroading. The farmer should know everything about railroading that relates to fruit growing, and until he learns these things he is at a disadvantage and will get the worst of it. (Applause.)

MR. DARGITZ. Teach them to raise better instead of more fruit.

PRESIDENT JEFFREY. Mr. Dargitz has the key to it, and that is what Professor Clarke is doing. And at the same time teach them how to get the money out of that fruit. If Mr. Dargitz were raising almonds just for the fun of taking his friends around to show the good crop, he would not need to know the business. If he need to get his wife a pair of shoes occasionally he needs to know how to sell those almonds. Mr. Ellery is here and would like to read his paper before noon. We will hear that delightful paper on roads from a man who is not afraid to face the music on a good many things besides roads. (Applause.)

BETTER STATE ROADS.

By Nathaniel Ellery, State Engineer.

MR. ELLERY. *Mr. Chairman, Ladies and Gentlemen:* In 1893 the State of New Jersey began a state-wide agitation of the road question. They enacted a law known as the State Aid Law. It was a pioneer along this line. They had taken their cue from European management and control of roads. After the State of New Jersey had gone but a year or two on that line other states adopted the plan, and it became, in the Eastern States, quite universal. Since 1893 there have been several minor changes in the law, and recently the State of Pennsylvania, which is spending some millions of dollars in the construction of state aided roads, has been figuring more along the line of getting a system of state roads aside from the state aided roads. We know that in the State of New York, where perhaps the state aid has been extended more than in any other state, about one hundred and sixteen millions of dollars are being expended on state aided roads. I mean by that the county spends perhaps one half and the state one half. The great question with these state roads is not merely in the construc-

tion of them, but it is in the maintenance after you get the road constructed. I have seen in the State of New York good roads constructed, and I have seen those same roads in a very few years deteriorate until they were—well, some of the worst roads in the State. If, after those roads had been constructed, you would put on a system of maintenance to care for them, then you would have good roads and would enjoy the benefits of them all the time. There, where it took about five years for them to detoriate, you would have had the benefits for those five years, and if the maintenance kept up you would have probably everlasting benefits from roads. This question of maintenance has been taken up benefits from these roads. This question of maintenance has been taken up pretty thoroughly by the State of Massachusetts, which has a system of state roads, as a number of the other states have. I might explain the roads more than the construction of roads. The aid plan is worked something like this. The state provides for one half of the cost of construction, in coöperation with the county which provides for the other half, or a percentage. In New York State they provide for one half each. In the State of New Jersey it is provided as follows: the state one third, the county one third, and either the general road fund or the property owners who are benefited by the road or the construction or improvement of the road, pay the other third. In the State of New York it is partially paid by the county and partially paid by the people who are benefited by the improvement. After this road is completed, it is turned over to the county for maintenance. You will notice that right here is an important point. The county takes the road and is then held to certain rules and regulations by the state, and it must follow out the maintenance in accordance with those rules or regulations or else the state steps in and spends the money to keep it in such shape as they deem proper. That, in a general way, is the state aid system, but, as I said a little while ago, the State of Pennsylvania has been figuring out that they want a state system. They want some roads controlled and maintained by the state.

The State of California, at the last session of the legislature, passed an act for the bonding of the State for eighteen millions of dollars for a state system of roads. That seems to be the latest development in the East. This State desires to bond for eighteen millions to construct the roads to tie up the various county seats of the State, then the counties to take up and construct the secondary roads, perhaps somewhat after the manner of the state road. The state road would be used as an object lesson or example by which the county would work out its minor roads. The question naturally arises, whom do those roads connecting the county seats benefit? As an educational proposition they benefit every one. As tying up the county seats they benefit every one. As a matter of maintenance they will vastly benefit every one, because at the present time in the State of California we have practically no maintenance. On our approximately 55,000 miles of roads in the State of California, I dare say there is but very little maintenance, although we expend per annum three and one half millions of dollars upon these roads. In the past ten years if we had taken half of the three and one half millions we would have had about eighteen million dollars to put in permanent improvement. To be sure, we have got to spend part of this money in keeping the roads up.

There is another item in the State taking hold of the roads. We want to get those roads away from local influences. When there is a dollar expended on those roads we want that dollar to show, and the only way we can get away from local influence is to take it out of the hands or partially out of the hands of those who meet their fellow citizens and say, "Hello, Bill," or "Hello, Jack," and the man goes out to fix up the road and the supervisor says, "Well, you have got a couple of boys with teams; take them out on the road." That man is spending the county's money. He ought to put in the full time on the road. He ought to see that the county gets its money's worth. It is to his interest to see that, but there are certain local influences that tend to stop that. We want to get away, if we can, from these local influences, and the farther we go the nearer we get to the State where we will certainly get away from some of them.

Again, the State, in constructing these roads, can employ good engineers, can adopt a system of maintenance that perhaps the county can not take up, perhaps for political reasons, or for other reasons, as lack of funds. Some sort of scheme will be evolved, perhaps on the European plan, of giving a man a section of road and let him care for that. Not to give him too much road, but let him look after his portion and see that it is kept up. Then the system of rewards that they have in Europe might be a good thing, reward the man who does the best work on a certain section of road. That would be an incentive for a man to work a little harder.

We have seen the failure in the State of the roads, from the use of oil. Most people, I should say, in the State say that oil is a bad thing. I don't condemn it, because I know how it has been used. I believe to-day if it had proper application and proper attention after it had been applied—and by proper attention I mean the strictest kind of maintenance—the oiled road would make a good road and make a cheap road. I have seen a dirt oiled road kept up in such shape that it was as smooth as this floor. I have seen that same road, after the supervisor went out of office and another man took it up, in a year and a half, go to pieces so that it was no better than the ordinary rutty, muddy road that we see so often.

There is another question that comes in that makes me believe we should take hold of this thing; the city should pay its part, as they do under the aid plan or as they would do under any state plan. I think in the rural or country districts of the State we need to make the conditions better. I sincerely and earnestly believe that we want to retain the young man and the young woman on the farm, and if we want to retain them there we have got to make something attractive to them, and a road is a part of the scheme of giving them attraction, and I believe with good roads that it will help in holding a great many of the young people on the farm. I think this is a very, very important factor.

I have spoken to you of the maintenance of roads. I want you to get that clearly in your mind. We have various sorts of roads, different kinds of construction, but we have no system of maintenance. You know that any piece of construction, no matter what it may be, if it is a house it needs painting after a while, if it is any sort of work it must be cared for, and with the road, above every other kind of con-

struction, it receives the severest test; it should be cared for most carefully, for it you don't care for it you are bound to get bad results.

Now, as to the question of bonds in the various counties. The people are bonding and putting the money in the hands of a commission, and that commission, after the construction of the road, turns it over to the supervisors for maintenance. What the bond issue by the State for eighteen million contemplates is this, that if the county, under the bond issue, is built up to a certain standard, then the State would assume or take it over and pay the county and then maintain that road. That is what is contemplated in that issue. By roads I mean the main roads between the county seats. This scheme, therefore, allows the county to build its roads, but when it comes to the maintenance, which is the important factor in the road problem, then the State takes hold of it and maintains that road, and I sincerely believe that the maintenance of the principal roads can be better handled by the State than it can by the system we have at present. The states that have the state aid plan in the East have gone through the same experiences that we have gone through, and they are getting out of the rut, they are getting good roads; and the State of California, above any other state in the Union, should have good roads, because it is the great fruit raising state, it is the great scenic spot, you might say, of the world. You are spending in the State of California to-day something like fifty or sixty million dollars to haul your products just to the railroad station. If you put your roads in a proper system of construction and maintenance and look after them properly you can cut this expense in half. If you do that you have saved that much money, but you have not only saved it that way, you have given the country district something that they want. Not only that, but I dare say that with the good roads you will hold in check excessive freight rates. It may be forcing the thing a little, but the time may come, if we had smooth, good and dustless roads, that you may have some kind of transportation outside of railroads. You may have motors, and instead of about 5½ miles, the average haul now, you may be hauling 20 miles; you may make the railroads come to an economical basis of fixing rates. If with these roads you can preserve your fruit or keep it from being spoiled by the jolts, the price that you get for it is higher. I have watched grapes being hauled to market over the rough roads; I have watched different classes of fruit being hauled, and I have known any number of instances where that product has been badly damaged simply on account of bad roads.

I do not think there is any more important subject to us than this. The roads are a public institution, and they should be handled and looked after the same as a private business should be handled and looked after. The money expended upon them should be handled as economically as a private business. You don't see your great transportation companies, the railroads, employing various men to run the railroad business. For the construction and maintenance of these roads you see trained men, you see high class engineers, and some of the railroads, among them the Pennsylvania system, employ engineers who are really or practically in charge of the railroad. Now, it requires just as good an engineer to build a highway as it does a railroad, and it requires just as good an engineer to maintain a highway as it does a railroad.

If you leave the roads or highways, then, to untrained men, inexperienced men, you can't expect anything but poor roads; you have got to get them into the hands of trained people, and I think that through a state plan this matter will be solved and the roads will be put upon a proper footing. Understand me, I mean that the technical part of the road work should be in trained, technical hands, and the business part should be by good business men or men of large executive ability. We see to-day, for instance, where there is a good man elected supervisor who looks after his roads. Perhaps he has done something that has not quite suited his constituency; at the end of four years they put him out and another man is put in. How can you ever expect to get a system worked out in this way? I don't doubt but a great many of you here have seen this, that one man in charge of a piece of road had his views and ideas about the construction, and he went to work to carry them out. When the change took place and the other fellow came in, his views and ideas were diametrically opposed to his predecessor's, and he fixed it upon in his way, and the next fellow probably did the same thing, and instead of getting roads you got a hodge-podge out of it. As I have said, it requires considerable scientific ability to get these roads on a proper footing, and I think that the roads require engineers just as much as any disease requires the man of medicine. I don't think if you were ill at home you would go to a blacksmith to have him cure you. If you are going to get a road, I believe you will have to go to the engineer to get it.

In this bond proposition of eighteen millions of dollars, stop and think what it means; stop and think, by tying up the county seats, what it means. Again, stop and think what the opening up of the great Sierra Nevadas of this State means. You know that the southern part of the State has a great harvest, not only of oranges and lemons, but tourists. Those people can be induced to stay longer and spend more money if you give them good roads up through the Sierra Nevadas. They come out here to the coast with their machines, and they spend their money whenever they do that. I have been in the hotels and heard them say, "Well, there is no good of coming out here again." They can't go anywhere, owing to the mud and dirt and bad roads, yet if we had good clean roads for them to travel on they would not stop in that section, but they would travel over this beautiful country. That alone is a very important item. In the expenditure by the State of eighteen millions, just see how small it is compared with what we are now spending. Look at the past thirty years and see what we have expended on roads. We have expended alone on oiled roads some millions of dollars, and where has it gone? There isn't much of it left. I dare say that in the past thirty years the State of California, through its counties, has expended something in the neighborhood of sixty millions of dollars for its roads. If we can stop this and put a system into use and get it going and spend only eighteen million dollars for that system, and see to it that the money is put out properly and expended only on the roads, I think that the people of this State would all be for it, because it means as much to the State of California as any one thing that I know of. (Applause.)

PRESIDENT JEFFREY. I would like to ask one question, Mr. Ellery. If the people of the State of California could be assured that

we would have good engineering for the next four, eight or twelve years, they would vote for eighteen million dollars right straight down the line. How can they be assured that they will get their money's worth?

MR. ELLERY. In answer to that, we are not assured of much of anything in this world, but the present system is totally inadequate for our needs, it does not solve the problem, and if the problem is not solved by our present ways you have got to turn to some other scheme. I do say this, that what we need in office are men who will properly handle it, but that I can't guarantee.

MR. HARTRANFT. We had some experience in that down in Los Angeles, and I believe there is an ideal way of getting at those people. We voted over three million dollars in bonds for good roads. We have the best system of municipal government that exists on the face of the earth, and have recently found it out, but we have not got the same form of government in the county, and we voted three million dollars in bonds; they sold part of it; they put up a job in the selling of them through a private sale; we stopped them in the court, and the solid three have gone on and done about enough work to-day to amount in its total construction cost about half what the interest is on the bonds sold. To take the precautions, to get the money spent properly on the roads, which everybody was for, and the proposition carried by about four votes to one in favor, if it appointed a business man's advising board and a great engineering board and all the schemes that you could appeal to the voters, and then instead of having the power to force through the program as laid out, the entire will of the people and the entire intentions have been thwarted by the powers of the elected supervisors, because there is no form of government by which they can be reached until an election under the old plan, and southern California, I know from personal contact, is not for the state bond issue, although I am for the building of good roads everywhere, but southern California is not for it. We are going first to get a proper form of government so we can do it, and I met on the railroad coming up here one of the fine political bosses in the south, and he said, "When you meet any of those machine fellows over in Watsonville tell them they licked the stuffing out of us in Los Angeles, and they are all headed for Sacramento and they are headed there for direct legislation," and I think we have had in this convention before resolutions for the initiative, the referendum, and the recall. If it isn't out of order, I move that that is the sentiments of this convention. (Applause.)

PRESIDENT JEFFREY. We are under great obligations to the State Engineer for the able address he has made to us to-day. It has been illuminating and instructive and encouraging, and in behalf of the members here I thank him, both as a friend and as an official, for coming here to-day. He speaks with authority, he is a man of courage, a man of incorruptible honesty, and if he could build our roads for us there would be no question about the money.

PRESIDENT JEFFREY. The next paper will be by Mr. Frank Femmons of Ahwahnee, Madera County. Mr. Femmons is one of the pioneer apple growers of the high Sierras.

SOME OBSERVED CHANGES IN FRUIT TYPES.

By Frank Femmons of Ahwahnee.

In presenting the following observations that have reached over many years of association with trees and plants, I wish to disclaim any scientific attainment, or that they are entirely new to our scientific horticulturists. They may all be but simple things as most of the operations of nature are found to be when we once understand them; and, also, valuable in our work in orchard or garden.

I feel sure there are many operations in nature that contribute to producing changes in plant life; giving the plants their individual form and character and to their fruits their peculiar color, texture and flavors, often to the extent of producing new varieties, that are not as yet fully understood.

We have learned something about crossing and hybridizing, but with even our Burbank, the process is far from certain in its results. There must be other natural influences that we know little or nothing about that are constantly modifying the results of our best efforts. Some of these, as that of heredity, we know something of, but as yet have little power to modify. The influences of environment are more under our control. But do we yet know all the elements and accidental combinations that may have their influences in what we call environment or local conditions, to modify plants or their fruits? In a rough way we know many and can modify and control them, but I think we have evidence in our every day practical experience and observations that we have not mastered all. Where did the old Rambo, the White Winter Pearmain, the Delicious, or any of our apples get their peculiar flavors and characteristics? It is easy to ask such and a thousand other questions that will start some theory in the mind, but I am not able to answer them. The facts of observation here referred to as illustrations, are, I think, of a class that gives an evidence of some operations in nature that are not entirely understood. Similar facts may not be new or unheard of to our scientific people, but I have not seen them referred to, not explained in our common horticultural literature.

For five or six years past I have been watching a change that has affected some Black Ben apples at Home Orchard. I wish to make the statement of the observed facts as full and accurate as I can.

In different parts of the orchard are many top-grafted trees of it, and on many different varieties as stock. As it happened, several trees regrafted were near some of the old Ben Davis of which Black Ben is a seedling. The Black Ben has a solid red color, while the Ben Davis, as every one knows, is prominently striped. The first year the new trees immediately near by, or in the next row to the Ben Davis bore fruit, I noticed that many of the apples were very noticeably striped. The evident fact was a puzzle to me, and besides some of the fruit had its typical color. The next year the change was more pronounced, and I wrote something of it to a horticultural friend in the East. He thought the only explanation of it was that "the scions used had been mixed." That didn't satisfy me, and I have been watching it ever since.

While at first the change was confined to the trees near the Ben Davis (24 feet apart), it has extended out year by year until the past season it was plainly noticeable *five rows distant*. Beyond that, and in

other parts of the orchard where Black Bens are fruiting near other varieties such as Lawver, York, Imperial, and others, the color is entirely unchanged. Except in color, I can see no other change—size, form, quality and the peculiar shape and modeling about the eye-basin are all typical Black Ben.

Some years ago I had an observation that I think in the same line. I had planted two patches of potatoes. They just cornered with each other. One was planted some days before the other. As seed potatoes were scarce that year they were both cut to "single eyes." One was a red potato we used to know as "Garnet," the other was similar in size and form, but white. They both made fine growth and yield. When they were ripe and dug the hills at the contiguous corners were about *equally filled with both the white and red* and the mixture extended for a number of hills into each patch. Beyond that they were all typical of the variety planted.

Another experience in potato growing. Some years ago I sent East for a small quantity of what was called "White Elephant." It was planted in the garden along side of some Early Rose. When they were dug but few of them were of their typical white color—and were evidently mixed with the Rose. Some of them were uniformly of the Rose color; some were mottled in splotches and bands of red and white, while a part of them retained their original type. They were all planted the next year but the crop had lost all its character.

Benjamin Breckman of Illinois claims that this mixing of the tubers when different varieties are planted near each other is the true cause of potatoes "running out" and becoming worthless, which coincides with my own experience and observation.

But how do the tubers mix? Does the influence in the case of the Black Ben apples and in that of the potatoes come through the pollen? The Early Rose so very seldom form a bloom, that in the example of the White Elephant it would favor a doubt of that conclusion. We can understand, or at least know the fact that the pollen of one variety greatly influences the true seed germ of another. Has it some power, also, that we do not fully understand; or is the change produced by a subtile diffusion of some hereditary relationship that under certain conditions reaches back to some influence or association of former generations, or a common origin?

Two or three years ago, among some yellow speckled beans at gathering time, I was surprised to find some white ones. There has certainly been none of that color in the ones planted and no other growing on the place. In shelling out some scattered pods by hand, I found two, one with a single white bean near the middle, and in the other, two white beans with a yellow one between, the others in the pods were all the same as planted; all the individual white one seemed perfect to their type. We are apt in our ignorance of the true cause to call such things "bud variations," "freaks," and "sports," as though nature had momentarily forgotten herself and allowed some new creation to creep into her household by chance.

There is another class of fruit variations—the influence of the stock upon the scion, that is recognized in a general way, but I think the influence is often greater than supposed. It may be for the better in some characteristic, or, as is more usually the fact, for the worse.

In all my top-grafting (and I have done a good deal of it) I have always been careful to cut scions from the tree that produced the finest fruit of its variety, growth and all other characters considered. With some varieties but little change is noticeable, but in others the influence of the stock is often considerable, and I feel like taking the Delicious as an example. In the orchard are about one hundred top-grafted trees of that variety bearing, and the scions were all from a single tree. Of the tree propagated from it, a few are certainly highly colored, better in form and more juicy—finer apples in every way. Others are a dingy, pale color; some more elongated; some are inferior in quality; in fact, scarcely two trees bear fruits that are identical in all their characteristics. In most of the trees, however, the change is very slight. From my observation and experience I think the Delicious very susceptible to this influence; that is, particular in its associations as an apple of its high character has a right to be, for it certainly is the "Queen of its Kind."

I will give another example in the same line: A neighbor who planted one of the oldest orchards in this mountain section, found his old Grindstone (American Pippin) of little value, and about twenty years ago (the trees were about thirty years old) top-grafted them from a fine strain of Ben Davis. When they came into bearing, the fruit was neither Ben Davis nor Grindstone. It seemed to partake of the characteristic of both, but so blended that no one not knowing the facts could tell what it was. It had the flattish, round form of the Grindstone with the brighter stripes of the Ben Davis, only medium in size and worthless in quality. That was the most evident and best example of the influence of stock upon scion I have ever seen.

We explain such changes as the congeniality of stock to scion. But what is it, and how is it produced? What modifies the plant's organization that makes one of the same species congenial, and the other not?

There is another class of fruit changes that we are likely to hear more of in a scientific way in the near future. The modifications of many varieties of fruits by our Pacific coast influences have attracted attention for many years. We all recognize the fact, but I think it has not as yet so fixed our thought and investigation as its importance deserves. Many varieties of apples when grown here are scarcely recognizable when compared with the same as grown in their old habitat of the Eastern States. Our soil and climatic influences seem to develop some of the varieties into almost new and greater forms. Many of our local seedlings seem to have something inherent in their character that is *distinctly Western*. Besides our favorable natural conditions, I think, the converging and commingling of all the different types that have been heretofore comparatively isolated is producing varieties that in development will give us new and higher types of all our fruits.

I know that such observed facts in nature, and that we meet only once in a while, leads off into a line of speculation I am not scientific enough to explain or give them any particular application. All the natural laws and their operation we know contribute to the development and comfort of life. We have no reason to think that the more obscure ones, when better known and under our control, will prove any the less useful. With all the accumulated knowledge that has come to us out of the wisdom of the ages, we have no reason to think we have fathomed

its depths. Nor do we know how much the still unknown secrets of nature when mastered will contribute, if rightly used, to the power and welfare of the human race.

I am sure there are no lines of research into the still unknown fields of science that promise so great a reward as in that of horticulture—the propagation, care, and development of plants and their fruits. No other production of nature contributes so much, and directly to the physical life and welfare of mankind, and I can conceive of no limit to their future development and usefulness, nor of any ultimate knowledge of all the resources of nature that may contribute to that development.

PRESIDENT JEFFREY. We will now be favored with a paper on eucalyptus by our State Forester, Mr. Lull.

EUCALYPTUS COMMERCIALLY CONSIDERED.

By G. B. Lull, State Forester.

It is of great importance just at this time that reliable information on the subject of growing eucalypts in California be given to the public. Persistent reports of the impending failure of the Nation's hardwood supply, together with a growing belief that the future demand will be met, to a large extent, by California-grown eucalypts, have already induced hundreds of persons to establish plantations and thousands to buy stock or acreage of them, in order to take advantage of this market. Many more will doubtless become interested during the next few years. Inasmuch as many purchasers of stock or acreage in eucalyptus companies are residents in Eastern States, their only chance of judging whether the claims of promoters are correct is by correspondence or through reading the publications of the State and Federal forest offices on this subject.

There can be no doubt that, rightly undertaken, eucalyptus growing is a sound, conservative business, of a sort to be encouraged. It promises to be of the highest value, not only to this State, but to the country as a whole, for the prevention of a hardwood famine is a matter of national concern. It is, however, of special interest to the State, for if the eucalypts become the principal hardwoods in use it means a shifting of the source of supply from the East to California and the removal hither of most of the woodworking plants depending on it. California will then furnish to the country not only the raw material, but the manufactured product also, with the utmost profit to herself. But these benefits will not follow, or at best will be greatly delayed, unless the business of growing eucalypts is, from the start, established on a sound basis. It is evident that the failure of any considerable number of persons to obtain as good results as they expect will seriously harm the industry, particularly if, on investigation, it is discovered that no substantial basis for their expectations ever existed.

Companies buying land for eucalyptus purposes should consider this seriously, for in that single transaction they determine the success or failure of their venture very largely. The belief is prevalent in California that land for any cause unsuited to agriculture is as good for eucalyptus as is the best agricultural soil. It probably is true that

this hardy tree will survive conditions that could not be withstood by ordinary field crops. But, if high returns are sought, the fundamental requisite, good soil, must be used. This fact must not be lost sight of.

In this connection it may be explained that good soil as applied to eucalypts has the same physical meaning as it has when applied to field crops. The soil must first of all be of good depth, that is, six feet or more from the surface to hardpan or other impenetrable material. Shallow soils produce short-boled trees. Equally important is the texture and character of the stratum underlying the soil, owing to its influence on the retention of moisture. Finally, the rainfall must be great enough to produce rapid growth or water must be artificially applied. These conditions of soil may be found in many sections of California, but in choosing land for eucalyptus growing it is vitally essential that the lowest temperature prevailing shall not be too cold for the species to be grown. Generally, it is necessary to confine the search to areas where the temperature is always about 25° F. Another factor of importance is that of transportation. Sufficient foresight should be exercised to guard against the exhaustion of profits by high freight rates, for the output of an acre of well-developed trees is exceedingly heavy. To meet this the farther-sighted growers are purchasing land situated along a railroad near the coast or, better still, along a navigable river.

Having selected good land, the actual development work begins. This consists in growing or purchasing seedlings of the best species and of hardy character. The work of growing seedlings is extremely exacting, for they must have constant care and attention from the time the seed is sown till they are set in the field. Especially must care in their watering be exercised, for on the amount and time of application of water depends not only the thrift and development of the seedlings, but determines whether they become victims of the fungous disease known as "damping off." Inexperienced growers almost always lose heavily from this cause, and even the most expert are not exempt. In almost all publications giving instructions on the best methods of seedling culture shading is recommended. It is questionable, in the light of recent experiments, whether this is either necessary or desirable. It is believed that hardier plants in greater numbers can be raised without shelter from the sun, although this will depend to some degree upon the exposure of the nursery site.

What has been said about the necessity of selecting good land applies equally to its preparation. Shallow plowing has long been the custom of those tilling large areas for wheat and other surface crops. I question if such tillage is the best for wheat, certainly it is not for eucalypts. Deep plowing should always be practiced, the deeper the better. As an illustration of this may be cited the usually luxuriant growth of blue gum on the dredged land at Natoma, Sacramento County. There, on land plowed by the gold dredgers to a depth of twenty feet or more, this species is making as good growth as can be found in the State. At first glance dredged land appears to be irrevocably ruined for crop purposes. It is only when we remember that dredging is merely another name for deep plowing that the reason for this thrifty growth dawns upon us.

In the same measure that good land and thorough tillage are neces-

sary preparations for an eucalypt crop are careful planting and frequent cultivation during the first two years essential. This is the period during which the character of the crop is determined and every one of these fundamentals must be shaped as though it were the determining factor. Neglect of any one will produce its corresponding deficiency in the matured product.

The age at which eucalypt plantations become marketable is a subject on which opinions differ greatly. It should be borne in mind that this is a matter which many factors will determine. In the first place by age is meant financial age, that is the time in the life of a plantation when, considering rate of growth, quality of product, distance to market and rate of sprout growth together, it is determined with approximate exactness that more money will be made by cutting than by holding the trees. It is readily understandable that this is so. For, if at the end of ten or twelve or fifteen years it is found by measurement that the production of lumber is greater, quantity and quality considered together, after deducting loss of suppressed trees than it would be by the succeeding sprout growth then certainly the financial cutting time is still ahead. Of course, this is reasoning without reference to the bank account of the owner. It may very well happen that he will decide to forego maximum yield for the sake of returns before the financial cutting age is reached. In this connection it is debatable as to what course should be followed. It would seem better business to borrow, using the plantation as security, than to sacrifice too greatly. Likewise the demands of the market are important in that they determine the character of the product which will yield the highest financial returns. Thus market demands have their influence on the financial cutting age. Also is the location of the plantation as regards accessibility to market a prominent factor. It will be readily seen that if the market demands determine cordwood to be the most valuable product, the financial cutting age might lie anywhere between the fifth and tenth year. But if the tract is so located that the profits on cordwood will be devoured by scarcity of labor, high wages or heavy transportation charges then a cutting age for a more easily handled product must be selected. These considerations demonstrate how impossible it is to say in advance that the grove will be harvested when ten or twelve years of age.

Many people noting the tremendous acreage being planted have voiced the question, "Will not the industry be overdone? Granting there is now a market for all that can be raised will not the yield a dozen years hence be so great that the price will drop?" Circular No. 116 of the Forest Service sheds considerable light on this phase of the eucalyptus problem. Therein it is set forth that during the period 1899 to 1906 the hardwood lumber cut decreased 15.3 per cent, the decrease taking place at a time when there was the strongest demand ever known for every class of structural material; when the output of pig iron increased 15 per cent, that of cement 132.17 per cent and even that of softwood lumber 15.6 per cent. That the decrease was due to diminished supply rather than to lessened demand seems to be proved beyond question for during the same period the wholesale price of various classes of hardwood lumber advanced from 25 per cent to 65 per cent. Every kind of hardwood found in quantity sufficient to make it useful has been put on the market and hardwood timber is now

being cut in every state and every locality where it exists in quantity large enough to be cut with profit. These conditions could not prevail were the decrease in production due to a falling off in demand. In Ohio the decrease in hardwood products between 1900 and 1905, according to census reports, amounted to 57.4 per cent; the rank of the industry fell from fourth to twentieth place and the number of employees decreased 40 per cent. In Indiana, during the same period, the value of the products fell from third to eighth place; the value of the products decreased 27.1 per cent; the number of employees decreased 42.6 per cent. This by way of showing the threatening position in which the hardwood industry stands and how improbable it is that the eucalypts grown in California will cause an oversupply.

But the question arises, "Granting all this, is the quality of the eucalypts such that the wood can be readily substituted for hardwoods in common use?" An unqualified answer in the affirmative can be safely given. For although the tests of the wood have not as yet been exhaustive, they have proceeded so far and with such favorable results that the wood of the commercial species of eucalypts can be likened in quality to the best grades of hickory. This insures its value for structural purposes and with its susceptibility to a high polish guarantees its employment in vehicle and furniture manufacture. From the standpoint of utilization the better species of eucalypts leave nothing to be desired.

These statements are made with full knowledge of the experience among those who have used the wood in green condition that it checks badly and does not hold its shape. Indeed, the practice of using green wood has been so general that a feeling exists that eucalyptus will not yield to seasoning methods. Nothing could be more absurd. The wood is hard, dense, and of close grain. It grows rapidly, and hence is full of sap. Naturally, if the juices are drawn out quickly, something must give way. But if the wood is understood and rational, slow-seasoning methods are applied the eucalypts will be found to respond to them as do the hardwoods in the East. It is safe to say that the experience with eucalyptus of Californians—long accustomed to redwood and pine—would not have been duplicated if they had been handled by men accustomed to handling green hardwoods.

These statements embody some of the possibilities of the eucalyptus industry. We have noted that the growth of these trees is fully five times as rapid as that of any Eastern hardwood; that, on account of its climatic requirements, it can not be grown commercially in the United States outside of California; that its wood is capable of substitution for the Eastern hardwoods rapidly nearing exhaustion. Do not these circumstances justify faith in the industry? Consideration of them has led many to interest themselves in the growing of eucalypts and the sale of eucalyptus lands. At this time there are fully one hundred companies dealing in some sort of eucalyptus commodity, and, very regrettably, some of these companies are of wildcat nature. This is inevitable in an industry of this kind when in the hands of men expert in salesmanship but ignorant of soils and tree culture. They have very naturally confined their energies to those features of the business they were familiar with, leaving the great fundamental problem of tree culture in the background. Not content with this, in

some instances they have greatly overestimated possible returns in an effort to catch the buyer with a fondness for long shots. Lest I be misunderstood, let me say that I am not talking about all eucalyptus companies. There are many high-class, thoroughly honest companies growing trees in California, who, by the care of their plantations, prove they want to give investors the worth of their money. Such companies should be encouraged, for in addition to enriching themselves and those associated with them, they are adding to the Nation's timber supply.

PRESIDENT JEFFREY. Now we will ask you to remain a few minutes and let the Committee on Resolutions be relieved of its duties. Just read them right through and if there is any one objects to any resolution make a note of it.

Mr. Kellogg read the following resolution:

RESOLUTION OF APPRECIATION TO A. R. BRIGGS.

Whereas, In the efficient and persistent efforts of Mr. Arthur R. Briggs in our behalf on the question of sulphur-cured fruits, all the growers of drying fruits in the State have been greatly benefited; therefore, be it

Resolved, That this convention extend to Mr. Arthur R. Briggs our heartfelt thanks by rising vote.

PRESIDENT JEFFREY. We will just arise and give that vote now.

The convention expressed its approval of the resolution by rising.

Mr. Kellogg read the following resolutions:

THANKS TO PROFESSOR STUBENRAUCH.

Whereas, The very persistent and efficient work of the Department of Agriculture, represented by Prof. A. V. Stubenrauch and his co-laborers, has resulted in showing us the great benefit of careful handling of our fruit in picking and packing, and they have also revealed the probable effect of various molds in relation to the keeping qualities of our various fruits, especially grapes; therefore, be it

Resolved, That the fruit growers of California in convention assembled, express our appreciations of the work and assistance from the Department of Agriculture, at Washington, with their able corps of scientific and practical experts who have done so much to advance the interests of fruit men. We recognize the careful and conscientious work of Prof. A. V. Stubenrauch as of an inestimable value to us, and hereby express our appreciation of his personal work, and thank him for it.

RESOLUTION FOR PLANT PATHOLOGIST.

Resolved, That this State Fruit Growers' Convention urgently request that the Department of Agriculture continue its experimental work, and add to its working force a Pathologist to give special study to these molds to see if we can not overcome the great losses from this source.

RESOLUTION OF THANKS TO PROFESSOR HERMS AND DR. SNOW.

Resolved, That we are indebted to Prof. W. B. Herms of the University of California and to Dr. W. F. Snow of the State Board of Health for their valuable and interesting lectures during the session.

Resolved, That the thanks of this convention are due and are hereby extended to all those who have prepared papers and addresses for this convention.

RESOLUTION ASKING LEGISLATURE FOR INSECTICIDE LAW.

Whereas, One of the controlling factors of successful horticulture in the State of California is the control of pests;

Whereas, A great many nostrums, concoctions, would-be remedies and adulterated chemicals have been foisted upon the horticultural people of the State; and

Whereas, There is more than a million dollars spent each year in California for sulphur, cyanide, sulphuric acid, lime-sulphur solution, bluestone, arsenate of lead, Paris green, soluble oils, etc.; therefore, be it

Resolved, That the State Fruit Growers' Convention, assembled December 10, 1909, petition the State legislature to pass a pure insecticide and fungicide law, which will guarantee to the consumer an accurate knowledge of what he buys; which will require a printed analysis on the outside of every package; that shall show the percentage of the active material contained therein, and analysis which will be comprehensive to the horticulturist, and one which will make the manufacturer of insecticides and fungicides, with his agents, criminally liable for any imposition, or for any misleading or false statement thereto.

Resolved, That a committee of five be appointed by the chair to draft a bill covering these several points. This committee of five shall consist of the State Commissioner of Horticulture, assistant professor of the chemistry of insecticides of the University of California, two manufacturers, and the professor of entomology of the University of California.

Resolution on Chair of Agricultural Economics.

Resolved, That we request the State University to establish a Chair of Agricultural Economics.

Resolution of Thanks to Press and Railroads.

Resolved, That we thank the great metropolitan press of the State for the fair and uniformly correct reports of our deliberations.

Resolved, That we thank the local press for all their courteous recognition.

Resolved, That we extend our thanks hereby to the lines of railroads and steamships for their usual courtesies and concessions.

Resolution on a Federal Line of Steamers.

Whereas, Transportation and the cost of seed is the most important question before the producers of California; and

Whereas, Efforts have been made to bring about legitimate competition between California and the market of the East; and

Whereas, The United States Government operates a line of steamers on the Atlantic in connection with the Government-owned railway across the Panama Isthmus; and

Whereas, An effort will be made to have the Government operate a line on the Pacific, to connect with the railway across the Panama Isthmus, and thus give to California a complete service; and

Whereas, The present system does not afford to California the benefits of legitimate competition, owing to the fact that the Pacific Mail Steamship Company operating on the Pacific is under the control and domination of the transcontinental railroads; therefore, be it

Resolved, By the thirty-sixth California Fruit Growers' Convention, assembled in annual meeting at Watsonville, California, that we do hereby memorialize the President of the United States, William H. Taft, Secretary of War Dickinson, and the congress of the United States, to speedily relieve the situation by the establishing of a Federal line of steamers on the Pacific, to connect with the Government-owned line of railway across the Isthmus of Panama and the Federal line of steamships on the Atlantic, thus giving to California a through and complete service; be it further

Resolved, The President of the United States and the United States Congress be memorialized to enact such legislation as will increase the powers of the Interstate Commerce Commission, so that it may be able to prevent any increase in freight rates at any time, unless the proposed increase in freight rates shall be found by said Interstate Commerce Commission to be reasonable and justifiable; be it further

Resolved, That we favor the enactment of laws whereby the capitalization of all railroad and express companies engaged in the transportation business shall be fixed and determined as a basis upon which transportation charges shall be fixed, so that rates charged may be regulated by law.

Resolved, That copies of these resolutions be transmitted to the President of the United States, the Secretary of War, and the United States congress and senate, and to the California congressional delegation.

Resolution on Polytechnic School.

Whereas, In every county there are boys and girls so situated as to prevent them from getting an agricultural or mechanical education, thereby being a great loss to the State, the public greatly losing thereby;

Whereas, The best interests of any community are conserved when every person is able to give the best service possible;

Whereas, The California State Polytechnic School is an institution for the purpose of bringing about the much desired conditions; therefore,

Resolved, That the legislature be asked to enact such laws as may permit each county, through its board of supervisors, to give a limited number of scholarships in the said school, in proportion to population and under proper qualifications.

Resolution of Thanks to Citizens of Watsonville.

Resolved, That the unbounded hospitality of the citizens of Watsonville has been accepted with great satisfaction. To the ladies especially who entertained us so delightfully with choice music and refreshments, we thank them with hearty appreciations for the same. The lantern exhibit by the Board of Trade, showing the fertile Pajaro Valley, has been fully appreciated and enjoyed.

Resolution of Thanks to Christian Church.

Resolved, That the concessions made by the Christian Church of Watsonville in permitting us to occupy their splendid auditorium and commodious side rooms, also of the careful attention given by its pastor and official members for the comfort and convenience of the convention, is deserving of, and does hereby receive, our most heartfelt thanks.

MR. KELLOGG. So far we have agreed in our report.

MR. STEPHENS. I move that the committee's action be adopted thus far.

The report of the Committee on Resolutions was adopted.

MR. KELLOGG. Here is another.

Resolution on Experiments with Sprays.

Resolved, That we request the State University Agricultural Farm at Davis to conduct experiments in the use of both wet and dry sprays, to determine whether the results can be determined by dry method of spraying.

Resolution adopted.

MR. KELLOGG. Now comes a matter of law, more than anything else, and the committee did not feel competent to pass upon it, as none of us are lawyers, but those who have presented it have studied it and I have no doubt it is correct.

RESOLUTION RELATING TO AMENDMENT OF HORTICULTURAL LAW.

Whereas, An act passed by the last legislature of the State of California, and which said act is known as the County Horticultural Law, and which among other things attempts to amend sections 2322, 2322a, 2322b, 2322c, 2322d, and 2322e of the Political Code of this State, relating to the county board of horticulture, is defective, vague, and uncertain in certain respects; therefore, be it

Resolved, By the State fruit growers in convention assembled at Watsonville, California, on December 8, 9, 10, 1909, that our senators and assemblymen be requested to use their best efforts to have said law amended in the following respects:

1. That section 2322d be amended by inserting after the word "day," at the end of the first section therein, the following: "During the time actually employed as such officers."

2. That a new section be added to said act to read as follows: "That the powers and duties of the deputy county horticultural commissioners shall be the same as those of the county horticultural commissioner."

3. That section 2322b be amended so as to contain the following: "The state commissioner may issue commissions as quarantine guardians to the county horticultural commisioner, or his deputies appointed by him."

4. That section 2322d be amended so as to contain the following: "In the case of the commissioner himself, his compensation shall be $6 per day when actually engaged in the performance of his duties; *provided*, that the term 'duties' shall include investigation and experimentation in the matter of devising new methods and improving upon old methods of combating and eradicating insect pests and plant diseases, and he shall be allowed, in addition to his said salary, necessary traveling and office expenses, including the amount necessarily expended in making public his said investigations."

5. That a new section be added to said act to read substantially as follows:

"The boards of supervisors throughout the State are hereby empowered to set aside a sufficient sum to pay the salaries and other expenses set forth in this act."

6. That a new section be added to said act to read substantially as follows:

"Any board of supervisors shall have the power to employ at a reasonable compensation, and for whatever time is in their judgment necessary, an entomologist, whose duties may be to carry on investigations and experimentations for the purpose of devising the best and cheapest methods for combating insect pests and diseases of all agricultural crops and for the eradication of noxious weeds and other pests, and when deemed advisable by him, to issue bulletins or take other means of supplying the public with such information."

Respectfully submitted.

GEO. D. KELLOGG,
J. P. DARGITZ,
A. N. JUDD.
Committee on Resolutions.

The resolution was adopted.

MR. KELLOGG. That completes our report.

PRESIDENT JEFFREY. I have a communication here that it would be a discourtesy to overlook, but I don't know what to do with it. This is dated Auburn, Cal., December 7, 1909, from the Placer County Farmers' Union. Now, this must have the courtesy of a reply, and I suggest that you refer this letter to some one for a reply.

MR. KELLOGG. I move it be referred to the Chairman of the convention for a suitable reply.

The motion was duly seconded and carried.

PRESIDENT JEFFREY. When you go from this convention home, I hope you will say you had a good time and were pleased with Watsonville and her fruits. You have expressed your thanks through your resolutions to the people of Watsonville for what they have done, but you should tell everybody all over the State what they have done for you here. I say, "Hurrah for the people of Watsonville!"

The convention then adjourned *sine die*.

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PROCEEDINGS

OF THE

THIRTY-SEVENTH

FRUIT GROWERS' CONVENTION

OF THE

STATE OF CALIFORNIA,

HELD UNDER THE AUSPICES OF THE STATE COMMISSION OF HORTICULTURE, AT POMONA, SEPTEMBER 13-14, 1910



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FREDERICK MASKEW, *Assistant Superintendent*.....Sacramento

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PROCEEDINGS

OF THE

THIRTY-SEVENTH CALIFORNIA STATE FRUIT GROWERS' CONVENTION.

POMONA, CALIFORNIA, September 13, 1910.

Pursuant to call, the Convention met at 10 o'clock a. m. and was called to order by Mr. J. W. Jeffrey, State Commissioner of Horticulture, Mr. Frederick Maskew, Assistant Superintendent of the State Insectary, acting as Secretary.

The Convention was opened with an invocation by Rev. C. B. Sumner.

PRESIDENT JEFFREY. We will now listen to an address of welcome by Colonel Firey, Mayor of Pomona.

ADDRESS OF WELCOME.

By Mayor F. B. FIREY.

Mr. President, Ladies and Gentlemen of the Convention: Your chairman showed himself something of a prophet when he announced that the preliminaries would not be very interesting. Notwithstanding the physical disability of a severe cold, I can not forego the pleasure of extending the welcome of one of the most progressive and up-to-date cities in southern California to the fruit growers of this favored land of ours. I take pleasure in calling your attention to the fact that we have no saloons in Pomona; but we have eighteen churches and one of the best libraries in the south with 18,000 volumes and one of the most accomplished librarians in charge. We point with pride to our polytechnic high school, and to our 2,500 children in the grammar schools and nearly 100 of the brightest schoolma'ms in all the land.

We feel it most fitting that this convention be held here since this is a distinctly orange growing section. We shipped this season about 3,000 cars of oranges, 90 per cent of these going through the San Antonio Fruit Growers' Exchange. This demonstrates the importance of our orange industry.

I have to admit that I don't know much about orange growing myself, having been in the business for only twenty-seven years. Advice is usually given most freely by those who have been here two or three years.

But orange growing is one of the most fascinating avocations ever indulged in, and the fact that a degree of prosperity has blessed the industry is due in no small measure to the California Fruit Growers' Exchange. The Exchange has returned to growers $14,000,000, and out of these vast collections less than $1,000 has been lost in the past six

years. During the life of the Exchange, $70,000,000 has been paid to growers and less than $5,000 has been lost. This is a very remarkable statement and shows the ability of the men at the head of the Exchange. It is purely coöperative and for mutual benefit.

I had something of a speech prepared, but I am something like the boy chosen by the graduating class to make a present to the teacher. When he stood up to make the presentation speech he found his mind a blank. Finally he blurted out, "Here it is Miss Jones; the boys told me to give it to you," and then sat down. I extend most cordial greetings to you. I know that the sessions of the convention will be profitable, and we shall hope to see its delegates in Pomona again. [Applause.]

PRESIDENT JEFFREY. We are very grateful to Colonel Firey for his words of greeting. Now we will hear from Mr. A. F. Call, a prominent attorney, but, better than that, a prominent fruit grower of his district. Mr. Call will speak in lieu of Mr. Story, who could not be present to-day. [Applause.]

MR. CALL. *Mr. President and Gentlemen of the Convention, Fellow Growers, Ladies and Gentlemen:* I thank you for this cordial greeting. It is unfortunate for you that Mr. Story was not able to be present this morning, for I apprehend that there is no one in southern California that could take his place and say to you what he would wish to say; for, with his twenty-five years of experience in the growing of fruits and his well known zeal in behalf of all the growers and his own experience as an organizer of the people in the protection of their industries, he can speak with an earnestness and enthusiasm for the cause that no other person could very well supply, and especially no stranger to the industry, for I regard myself as something of a stranger, only having been here for about three years. So, if I fail to express Mr. Story's views in this matter, you can attribute it to a want of knowledge and acquaintance with the subject that he would have.

But I know that you will all agree that he would wish me to very earnestly thank the Mayor and the people of Pomona for their cordial hospitality and for these words of welcome that have been spoken by their Mayor. And while, perhaps, he, if he were here, would not want to vouch for the absolute temperance of all the people that attend a meeting of this kind, I am sure that he would say that we will try to get along without the saloons during this convention, and that we will try to avail ourselves as much as we can of the numerous churches which are said to be in this locality. But while Mr. Story, I believe, if he were here, would say that we could get along without the drink, he would say he is glad to know there are so many nice schoolma'ms in this community and he would say, "Let the schoolma'ms come and we will receive them with open arms and hospitality." [Laughter.] And I know he would want me to thank the gentlemen of the State Horticultural Commission for their loyalty to this industry and to express our gratitude to the great State of California for what it is doing in our behalf, and to the gentlemen of the National Department of Agriculture who have spent so many years in their efforts to build up and protect our industry, and for their presence here and helpfulness during this discussion. I think I can say that their words of advice

and their help have fallen on fertile soil, for I believe I am safe in saying that there is no industry in the United States that has responded so rapidly and taken such close counsel of the advice of the state and nation as this industry of ours. In fact, it is a matter of remark in Washington, as well as in California, that their work is very greatly promoted and facilitated by the interest of the people whom they are trying to help. And I feel that I could say, without boasting, in behalf of these people, that the effort that they have made during the past twenty-five years in building up this industry is worthy of commendation on the part of the state and nation. It must be remembered that this is a new industry; that while the people of the old world have had long experience, we have had none, and that we have had to learn all this in the short space of twenty-five years. It is not like any other agricultural industry where the experience of our fathers has given us some start, but we have had to learn it all, and it is the most artificial agricultural industry that is known. Everything about that is artificial. We have to make the tree, in the first place, and we have to bring our water at the expense of millions of dollars for long distances, as much as 50 miles in some instances. We have to build up the soil—in fact, everything we do for the tree from the time it is first budded until the crop is ready to harvest is artificial in its nature. We have to try to take the place of Nature in all these things, and in doing this, the most difficult of all things, we have in our great measure of success, accomplished what no other industry has accomplished. In this short space of time we have set out 125,000 to 130,000 acres of citrus orchards in California. We have produced a property that is conservatively worth $125,000,000—a sufficient sum of money invested to build a railroad from California to Chicago and equip it in first-class shape. We have developed at least 25,000 inches of water and brought it in conduits to these groves, and this year, if no great mishap prevents, we shall ship 50,000 car loads to bring thirty-five millions of dollars. Such an industry as this is worthy of the fostering care of the state and nation, and the people who have done this must have brought to their occupation intelligence and industry and constant effort; and we are here to-day to gather these words of advice and take them home and apply them. We have been too long in the business to accept any man's dictum of what we ought to do. We know that we have got to work out our own salvation, but we also know that we can gather some information from every thinker who has thought upon these questions, and we can take home that part of it which fits our case and apply it, and we can all do better by what we have heard.

This industry is only in the beginning. We have yet to learn more than we have learned about it. The time will come when these orchards will spread over far more of the hillsides of California than they now do, when people will be eating citrus fruits of our production all over the United States, and when California will say, "The backbone of the State, the great financial interest of the State, is our citrus industry." I thank you. [Applause.]

PRESIDENT JEFFREY. The "Introductory Remarks" of the chairman is simply to tell you of the little difficulties he had in getting up this program during vacation. I will never undertake again to get

up a convention during vacation. The work of assembling the speakers for the program is a very difficult matter at any time of the year, but it is exceedingly difficult when all of the leading fruit growers of the State are away enjoying their well-earned rest at the mountains or the seashore. If there are any defects in the program, I want you to charge it to that, and not to any fault of the chairman. I had a great deal of difficulty and did not get the acceptances on the program in time to have this program published by the State Printer and sent out in order to advertise your meeting as we usually do; but if we had sent this program out with so many eminent names on it, perhaps there is no hall in Pomona that would hold the crowd. It is, perhaps, fortunate that we did not have the program circulated in advance. The convention itself was called at a very opportune time, but it takes a month at least to get ready for it.

I wish to say, in regard to my own address, that it is intended to be merely an outline, merely a suggestion or a series of suggestions about the business of this meeting, and when you get down to business, I want every delegate at this convention to come here as a working delegate. I hope every man who takes part in the discussion, will speak tersely and to the point. This is the largest gathering we have ever had, and this is the thirty-seventh convention. Now, we will proceed with the selection of our committees and the business of the convention, and I hope you will do it in a business-like way.

MR. DREHER. In behalf of the Executive Committee, I would move that Mr. Maskew act as secretary.

The motion was duly seconded and unanimously carried.

MR. MASKEW. Gentlemen, I thank you. I will do the best I can to get these papers in shape so they will be of value.

The chairman then appointed Mr. C. C. Teague, of Santa Paula, and Mr. John Scott, of Duarte, as vice-presidents of the convention.

It was moved and seconded that the chairman appoint a committee of three on Order of Business. The motion having carried, the chairman appointed as members of such committee, Mr. Wm. Chippendale, Mr. W. C. Fuller, and Mr. Edgar A. Wright.

PRESIDENT JEFFREY. Now, if I may have your patient consideration a little while, I will read the remarks I wish to make on the opening of this convention.

PRESIDENT'S ADDRESS.

By J. W. Jeffrey, State Commissioner of Horticulture, Sacramento, Cal.

When the great movement for the standardization of deciduous fruits began in the Sacramento and San Joaquin valleys last November, an entire session of the first mass meeting was devoted to finding out if the alleged orchard conditions and abuses of the fruit trade really existed. It was said that many orchards had been neglected, and that in consequence the fruit produced was not of first-class quality. Rumors were abroad that much of the grading and packing had been defective and unsatisfactory the preceding season, and it was held by many that if these abuses were not corrected the business would soon cease to be profitable. The session opened with the presence of nearly three hundred growers, and for awhile no one seemed willing to make a statement of any kind regarding the points at issue. Finally, one of the heaviest

shippers stood before the meeting and opened up the whole question by frankly stating his company's experiences and failures in handling its business the preceding year. Others followed, outlining the past conditions found in orchard and packing house, and in an hour those rival shippers and growers had set forth the true state of the deciduous fruit business as it had never been exposed in public before. Every man who spoke agreed that if improved measures were not soon adopted, the deciduous fruit business would continue to decline. The effect of these candid expressions from rival shipping concerns and of these neighborly confessions from the growers was immediate, and in all the thirty or more meetings that followed in different sections of the north to promote standardization, not one voice was raised in protest against exposing the facts regarding the decline of orchards, or the methods of handling the fruit. The result of these meetings developed the decision that the best way to standardize fruits is to improve the condition of the orchards, and I believe the revival of the deciduous fruit business of the north will date from the day the growers decided at these meetings to go to the basis of their troubles, just as I know you will do at this conference.

I have had in view just such a meeting as this for several years. The idea grew out of the first interview I had with Mr. Powell when he came here to begin the study of fruit transportation. At that conference with Mr. Powell I tried to convince him that our citrus fruit troubles would prove far more fundamental than those arising from the handling of the fruit; that many obscure problems would have to be solved at the producing end of the business, and that the start should be made in a broad and scientific way at the very seat of our difficulties, and carried clear through from that point, before the citrus industry would be placed on satisfactory ground. He agreed with me, but stated that the plans were all made to begin with fruit picking and that the investigation would have to proceed along the lines originally designed. The results of Mr. Powell's work were so immediate, so magnificent and so helpful to the growers that for a time I fear the questions upon which rest the very production of the fruit itself were obscured—the problems we are assembled now to consider. And now we are met here to face the real issue as best we may, and the issue is this: "Are our citrus groves to be long-lived, healthy, and productive, or are they to become decrepit, of short duration, and fruitless?"

We are here to try to analyze some of the cultural difficulties of citrus growing, and I believe the success of this meeting will depend upon what we do for the future in that way, and yet we may draw from experience much that should help in determining the course of future investigations. I ask you to join in organizing some practical means of looking into the questions we must face, and of bringing into better condition our declining groves.

OBJECTS FOR THE CONFERENCE.

The subject of orchard decadence is so vast and so obscure that I find great difficulty in presenting an outline of what should be considered by this convention. Yet it must be done if our deliberations are to be conducted in an orderly and effective manner. In presenting the following synopsis for discussion, I hope that the delegates will

remember that this is their convention; that the commissioner is subject to their orders, and that they will amend or change the order as they may deem proper. The objects of the meeting should be, in my opinion, as follows:

1. To determine, first, if there is a serious deterioration of the citrus fruit trees of the State, or a marked decline in the productiveness of our older groves where properly cared for.

2. If it is found that the orchard conditions are not what they should be, we should get all possible information before this convention relating to the causes of unfruitfulness and decadence, and from this information determine upon definite lines of scientific research for the future, and designate their character and scope. Also, by discovering to our best ability the causes and effects of orchard decline, to afford some present relief to the growers whose trees are not doing well.

3. Having decided upon definite subjects of research, to take steps to secure scientific experts equipped for long and patient investigation.

4. From the results of this conference we should make broad and positive declarations upon the present status of the citrus industry, that shall set forth to the public a correct view of the business from all sides; declarations which shall also present to the authorities that tax the land, fix tariff rates, levy freight charges and regulate interstate traffic matters, a clear statement of what would follow placing further burdens upon an industry already bearing more than its share of difficulties and responsibilities in building up the material interests of the State.

If the production of citrus fruits is in proportion to the vast capital it involves, and the tonnage of crops commensurate with the risk and labor necessary to maintain the orchards, there is no question before us. But let us inquire if the reverse is not true in many cases. Are we not justified in holding this conference upon the subjects named in the call? Is there not a considerable acreage of our citrus fruit trees suffering from decrepitude, decline, or other cause of unfruitfulness? Are not some of our groves, which receive the best of care, failing to respond with profitable crops? I think we can find the answer in the tonnage shipments of the last few years, if we take them in connection with the vast acreage of oranges and lemons that has come into full bearing during the time covered by the late shipping reports.

Excluding the citrus fruit season of 1908–09 there has not been a material increase of citrus fruits during the last ten years. The total output of oranges and lemons for the ten years closing in 1908 was 248,206 car loads, a yearly average of 24,820. This average was exceeding nearly a hundred car loads by the crop of 1900–01, in which nearly 25,000 car loads were produced. Of course there has been a gradual increase of tonnage during the last decade, but the 30,000 mark has been reached only three times in the history of the industry, and one of these occasions occurred six years ago. By all the rules of natural increase the output should have reached perhaps 50,000 cars long before this. It is necessary to look no further for proof of the impairment of the average citrus grove than that afforded by these figures. Some may see safety to the industry in the fact that our crops are not increasing more rapidly. This view would hold with more effect if light crops could be produced of superior quality and of mer-

chantable sizes, but a low yield often means inferior quality and abnormal sizes of fruit. It is not foreign to the purpose of this meeting to state that our strongest claim for a protective tariff lies in our ability under protection to supply the markets of North America with cheaper and better citrus fruits than would be supplied by foreign growers should the California industry become seriously crippled from any cause. Without this tariff protection, cheap European labor and low ocean freights would wipe out our industry, and then the foreign trade would fatten upon a rich and helpless American market and dictate the terms upon which it should feed. If we are to maintain this market ascendancy, which is beneficial to both the California grower and American consumer, we must have regular, even crops, and to produce them we must prevent the decadence or abnormal behavior of our orchards whichever it be. Especially is this necessary with our lemon groves, the products of which must meet a most continual and exacting demand, and must also suffer competition with foreign stuff far into the millions, even under the restraining influence of a heavy tariff.

GENERAL TREE CONDITIONS.

But we may look to the trees themselves, as well as to tonnage shipments, for an answer as to whether there is a decline in the orchard outlook in many places. There is a State-long complaint about the retrogression of fruit trees, both deciduous and citrus. This must not be interpreted to mean that there is the remotest danger of a collapse of our great fruit industry. On the contrary, we know that through unparalled skill in fruit marketing, through the maintenance of thousands of older citrus groves in prime condition, and through the selection of new areas suitable to these fruits, the industry will be able to maintain its supremacy and remain prosperous and stable.

It is a fact, however, that decrepit and dilapidated citrus fruit trees are found from Table Mountain in the north to San Jacinto in the south, and, then, some farther down the State. From the northern to the southern limits of citrus culture we find hardpan soils, raw-sand soils, soils impervious, impoverished and in every way unfit, yet all of which land has been struggling for two decades to produce oranges and lemons, and with the most indifferent success. Decay from active disease, collapse, and soil unfitness and decrepitude from climatic dispensations have left their mark upon the trees borne by these lands. California has been advertised indiscriminately as the home of the orange, but there are many soils and situations where the orange is never at home. However, these unfit locations produce a tonnage of poor fruit that must be disposed of, which, happily, is rapidly growing less as the trees grow older. Were we here to consider only this class of orchards it would not be worth while, for the rule of the survival of the fittest will soon work its way out without aid from the investigator for this class of orchards.

But we are here upon a serious and far-reaching inquiry. Some of the best orchards of the State are becoming unproductive, and I fear some of them are failing under the best of care. Soils heretofore fruitful, groves heretofore profitable and sections formerly rejoicing in regular crops are now suffering from decadence, or at least from stagnation, and there seems to be no means of restoration in sight. I do not believe

one of these groves has permanently lost its health or vitality, most certainly not where active disease has not affected them. But men who once were rightly considered expert orange growers are now complaining that they do not know how to meet the adverse circumstances of later cultivation. In over a hundred letters I have received approving the purposes of this conference, not one failed to recognize their importance. These growers have not lost any of their former ability, but have gained in experience and proficiency. But I fear conditions have changed faster than has grown the power to meet them successfully, and hence I have called you together to see what you think about them and to take action upon any lines you may think effective in overcoming the difficulties, if any exist. We should provide for bringing to bear the minds of those trained in original research, for the field is rich with opportunity; we should encourage those endowed with the gift of demonstration, for research has already done some things that should be proved by further trial; we should organize those who are willing and able to work out in their own orchards the application of the principles that have been, or will be established by investigation, just as a great body of growers are now working out in this community the advantages of the cyanide investigations so recently concluded. We may be sure that it will require the use of every element available to retain the quality and quantity of our citrus fruits upon the old-time basis.

CAUSES OF DECLINE.

Having considered the question as to whether there is a decadence in our citrus groves, the convention will then no doubt turn to the causes that may have produced it. In discussing the causes I assume there will arise a great diversity of opinion, and that it will be a hard task for the convention to sift out from this diversity of views a series of broad and helpful conclusions. For example, the plant breeder will hold that heredity, or inherited weakness, may be the cause of tree decline; the plant physiologist believes it to be in part due to structural imperfections, lack of affinity between the root and the scion or a mechanical fault in their union; the soil chemist will explain to you that there are some elemental deficiencies in the soil that cause the deterioration of the trees; the plant pathologist, that many forms of disease are but the expressions of neglect or other forms of disease and indications that certain poisonous principles have taken possession of the live cells of the plant and vitiated their natural functions; some will hold that overproduction of fruit will finally bring about stagnation and decay; the practical grower and scientist alike will have many explanations for the bad condition of the tree, and yet out of this divergence we may sift some valuable conclusions at this meeting, or, at least, reach the conviction that it must be done for us.

Under the present status of our knowledge of these obscure orchard troubles it may be best for every one to maintain his particular belief as to causes. But it is also expedient that many of these views should be eliminated, for where many different causes are given to account for one effect they can not all be maintained. But this elimination must be based upon conclusive testimony, and hence it would be wise to employ some one to discover all the truth that science can uncover.

This brings us to the third division of our purposes here, namely, to prepare for an investigation of all our orchard troubles through a series of scientific research. This was my contention years ago, and I now see the necessity of it more clearly than ever. I deem it my duty to ask this conference to declare in favor of such an investigation and prepare the way for its execution, and I will be greatly disappointed if some provision is not made for such an investigation before we adjourn this convention. We should remember the success of the researches in citrus fruit decay in transit, and of the researches in lemon rot and of the cyanide investigation. To have a similar examination of the cultural end of the citrus fruit business would be as wise as it is necessary.

You have listened with some patience to the foregoing statements, and I will conclude with a brief discussion of our fourth purpose. The "average truth," as Mr. Woodford puts it, has never been told concerning the citrus fruit business, at least it has not been told from the house-tops. The roseate end of it has been too much proclaimed. The time has come when the average truth must be told in emphatic language, for the country must be made to understand that all is not gold that hangs from the boughs of the orange tree; that it is only gold when every function of the soil and tree is working, and that it is a man's job to keep them working; that it is only profits when every cog of the marketing machinery is fitted to its duty and oiled with coöperative spirit; and that the brake must be kept upon every parasitic and perdatory influence to keep them from running away with the whole works. The marketing machinery needs little attention. The insect problem and the care of the fruit in transit have been pretty thoroughly and successfully exploited. But let us discuss at the close of the meeting something of the powers and influences that deplete the business before the fruit has been produced and brought to sale. Lest we forget that we have been too boastful for the good of the industry, let's tell the "average truth."

Your citrus acreage will be assessed heavily enough and you will get a raise from the State Board of Equalization often enough without making the public believe there's affluence in every acre of orange grove. Your unbounded energy and enterprise will maintain land values without aid from the Ananias Club. When the fruit tariff comes up again for adjustment, it can be done more justly to your interests if we eliminate the untypical and often untruthful statements of extraordinary orchard returns. When the railroads attempt to absorb your tariff advantages, or raise your freight and refrigeration rates, it does not make them less covetous to show them only the bright side of the fruit business. When the Interstate Commerce Commission undertakes to stay the hand of the Transcontinental Freight Bureau it is not helpful to the grower's cause to have exaggerated crop records and imaginative account sales in every pigeonhole of the bureau.

In conclusion, I ask the members of this convention to give their best thought and judgment to the work before us. Let us be determined to meet the difficulties with energy and understanding, and all unite in seeking a solution of every orchard trouble, of every impediment that may hinder the perfect development of the greatest fruit industry in the greatest fruit-growing State in the Union. [Applause.]

PRESIDENT JEFFREY. The next thing on the program, ladies and gentlemen, will be a response to this address by Mr. P. J. Dreher, of Pomona. [Applause.]

MR. DREHER. *Mr. President, Ladies and Gentlemen:* We have had presented to us a most remarkable statement of the facts that confront you. I think that everything that Mr. Jeffrey says in his paper should be done, should be regarded, and I mistake the temper of this convention and the intelligence of this people if they do not go to work at this thing with a will that will leave no doubt as to the success of the future. I think the time has come when a more definite, scientific, intelligent basis must be used in order that the prosperity of the industry be prolonged and continued without some setback. You have now one hundred and twenty-five millions invested in orange groves and lemon groves of this State, and you are not getting the returns that you ought to get for the money invested, if you take into consideration depreciation of the plant, a thing which has been heretofore neglected by all people who have furnished certificates as to the profits of orange growing. In the controversy we have just had before the Interstate Commerce Commission, one of the items of great value is the depreciation of plant. Have we considered that in any estimates we have made? No. The icing plant claimed it deteriorated ten per cent; the railroad company claimed a deterioration in the refrigerating cars; they bring everything against you as an item of deterioration. You have no way of knowing what the deterioration may be. You don't know what trees twenty-five years old now will bear in five years, a larger or smaller crop, or whether they will bear at all. This depreciation should be fixed more definitely than we have been able to fix it with the haphazard way we have, and it can only be settled by scientific investigation. It can only be obtained either through the Government of the United States or the government of this State. Just think of it! One hundred and twenty-five millions of dollars investment in the industry that will be worth less to-morrow than to-day because we have not scientific investigation! You are confronted with the statement that you are having great revenue-producing properties when the tax assessor comes around. The railroads confront you with the fact that you are making a great deal of money. As our chairman says, they have got it pigeonholed, and in most cases, probably, the returns are exaggerated. Now, why should we allow such a condition to continue? In going before the Tariff Commission, as you will have to go soon, you must present facts to show them that you are entitled to the protection they now give you; otherwise, the clamor is, from the importer, from the speculator, and even from the misled and misinformed consumer, that you tax them too high for your fruit, yet you would be paying an enormous burden to the carrier and have unjust protection, and the land would be flooded with foreign fruits, which can be produced with cheaper labor, cheaper transportation, and where would the consumer be? He does not see that, but you have got to bring the facts before the consumer and before the commission, that things are not all as golden as they appear to be. When you compete with the railroad, when you are confronted with rates, the same thing arises, and the fact is, that the railroad rates to-day are made upon what the traffic will bear. They have not been able to produce definite

information of what it cost to haul a car load of oranges across the continent, and the deduction must be that they have charged all the traffic would bear. In fact, Mr. Leeds said, only a few days ago, when he was asked what they would charge if they precooled the fruit and iced it, that they would charge what they thought it was worth to the shipper. You must, by scientific investigation, determine that there is a charge for depreciation as you can present that intelligently both to the carriers and the Tariff Commission and to your assessor. I can not too strongly urge this matter of necessity of presenting it to the carriers, because you are paying enormous amounts, and while we have done well in preventing the increase of the freight rate on oranges and lemons, it is all in abeyance and the carrier now is taking another tack, another indirect increase, and we will probably have to fight the same batle next year. You should establish more definite value to the depreciation, which I know this convention will do, and pass some resolutions or get up some united action by which they will interest the United States Government or the government of this State to make such scientific investigations as only can be made by the Government.

I am not going to take any more of your time because I have nothing more to say. You must go at this subject with your whole heart and with a will and a determination to succeed and find out what you want and ask for it. [Applause.]

The convention took a recess until one o'clock p. m.

AFTERNOON SESSION.

PRESIDENT JEFFREY. The convention will please come to order. The members of the Committee on Order of Business were delayed in getting their lunch, so we will have to wait awhile for their report. The next part of the program is a report from the county horticultural commissioners of the seven citrus counties as to the actual condition of the trees. Is the Los Angeles County Commission ready to report?

MR. STRONG. *Mr. Chairman, Ladies and Gentlemen:* About a month ago the Commissioner, Mr. Meserve, asked each of the inspectors of Los Angeles county to hand in a report on orchard conditions in their separate districts, and that was handed in last week. I never have seen it, so I can't tell you anything about it. It was to be here, and probably will be here to-morrow. Of course, our orchard conditions are different in each locality. While in some localities the conditions are good, in other localities they are not good.

PRESIDENT JEFFREY. We will now hear from Mr. Pease.

MR. PEASE. *Mr. President, Ladies and Gentlemen:* Speaking for San Bernardino county, I can say that the general condition of the citrus orchard is good. Like all other counties, we have some reports occasionally of trees that are in bad shape, but upon looking them over I find, in the majority of instances, it is to my mind caused by con-

ditions that can be eliminated or improved. For instance, we have places where people were talking about decadence of orange trees. I know of one locality where a few seedling orange trees and Eureka lemons are dying. The cause has been investigated, both by the scientific men of the University and by myself, and it is the consensus of opinion that the trees were planted from 8 to 12 inches too deep, in a heavy soil, consequently they have become rotted. Other causes might be attributed, largely to a lack of fertilizing in some instances and lack of irrigation. Sometimes it is due to a heavy frost. Sometimes when trees in the older localities have been, as we say, hit very severely by the frost, it takes one or two years to recover. Again, some trees, it is claimed by people, and maybe their reasons given are good, that trees might be budded on the wrong kind of stock. It is generally conceded that lemon stock is very poor stock to bud oranges or lemons on to. I have seen instances where trees appear to be getting mottled leaf and people have tried with fertilizers to change the color and get the rich color desired, but with fertilizers they did not get it. I know of one man in my county who carefully dug down close to the trees among the roots, and dug as deep as he dared to dig, and he applied a little thoroughly rotted manure to those trees and he eliminated the mottled leaf entirely. The general condition of the trees is good, and the outlook is for a much larger crop than we have had in a good many years.

PRESIDENT JEFFREY. Do you claim that in San Bernardino and Redlands the orchards are doing their duty like they used to twelve years ago?

MR. PEASE. I think they look for a larger output this year than we ever had before. There are orchards where the output is poor. I have seen decadence of the trees in seedling trees; one orchard was not bearing anywhere near a full crop and in another locality where the trees are of the same age they are still bearing a good crop. I think that is all I have to say. [Applause.]

PRESIDENT JEFFREY. We will now hear from Mr. Cundiff.

MR. CUNDIFF. *Mr. Chairman, Ladies and Gentlemen:* In Riverside county the present crop will be very much better than we had last year. Our old groves are not bearing what they should and what they did eight or ten years ago, but there is some improvement, enough, at least, to make us a little bit optimistic in regard to the future of our old groves. We have in our county, as near as we can get at it from our assessor's books, about 24,000 acres in citrus fruits. I think this season will see a planting of perhaps 1,000 or 1,200 acres more. While we will have more fruit than we have had for a number of years it is not to be credited to the old groves, but more directly to the new groves that are coming into bearing.

A MEMBER. I should like to ask what you mean by old trees?

MR. CUNDIFF. Our main trouble, of course, is with the navel; that is because it predominates. I should call a tree old after it is about fifteen or sixteen years of age. Then the deterioration has usually shown itself, commencing from the fifteenth year. We have some in a portion of Riverside that are over thirty years of age.

PRESIDENT JEFFREY. Mr. Roy Bishop, of Orange county.

MR. BISHOP. The conditions in Orange county are very good indeed. There is an extremely large planting of young trees, lemons

and oranges both, the Valencia predominating, and in the older Valencia orchards they are still bearing. In the case of the navels there is a slight decrease in many of the orchards that are over fifteen years of age and in some of the seedling orchards. The condition regarding insect pests is being materially improved. We have something over fifteen large fumigating outfits. The trees, I think, in some instances, show a lack of fertilization, but deterioration on good soil, in the case of the Valencia, is not noticeable. In the case of the navel it is noticeable only upon the thinner soils and not upon the most fertile ones. In seedling orchards over thirty years old, some are not bearing their full crop, but on the other hand, there are a few exceptions of trees that are in elegant condition. The general citrus condition of Orange county to-day is better than it was two years ago, and I think that is largely due to fighting insect pests more than they did at that time. [Applause.]

PRESIDENT JEFFREY. Mr. O. E. Essig, of Ventura county.

MR. ESSIG. *Mr. Chairman, Ladies and Gentlemen:* To speak right to the question, we simply must consider this, as I was notified: Is there any appreciable decadence in orchards which are well cultivated? In our county I can emphatically answer, no. After making a complete canvass and having been personally in every orchard in Ventura county, we find conditions to-day very favorable. But it does not mean that the general decadence throughout California can always correspond to Ventura county, for two reasons. Ventura county is a comparatively young county in citrus culture. There are probably more young orchards going out to-day in this county than any other county of its size. We have no old groves, except one or two, which are from thirty-two to thirty-five years old, and these trees are doing first-class work. Last year, in Mr. Blanchard's orchard, we found that his orange crop kept better than ever before and producing all the time a normal crop. This orchard is approximately thirty-five years old. He has also a lemon orchard which was budded on to old orange stock, and this looks better this year than before, probably due to the face that certain insect pests were cleaned out. Take the Piru district, which is farthest inland and would correspond with San Bernardino and Riverside for climate and soil. We have there one orchard thirty-five or thirty-six years old which is in normal condition and bearing well. A lemon and an orange orchard are twenty-three years old, and these trees promise better crops this year than ever before. Now, we have orchards which do not look well and we attribute that, not to any unknown, mysterious disease which we do not know of, but solely to lack of proper fertilization, cultivation, and irrigation, and probably in every locality we find this is the case. That is briefly the condition in Ventura county. [Applause.]

PRESIDENT JEFFREY. Mr. Beers, of Santa Barbara.

MR. BEERS. *Mr. Chairman, Ladies and Gentlemen:* There is a very small decadence in Santa Barbara county in the citrus industry, not to exceed eight per cent. It is due to one of three things. Some of our ranches have been leased out for four or five years while the owners have been in Europe. Those ranches have suffered from lack of attention. We have gum disease attacking some of the trees in the district, and we have a mysterious root disease that we do not know the name

of—a disease that attacks the roots in the fibrous young live growing section of the root and gradually approaching the tree where discovered, and the root is treated. We have a number of trees that have been through this process that are now bearing thrifty crops. We have, in Santa Barbara county, probably the oldest commercial orchard in the State of California. That orchard to-day has the most thrifty and generous supply of fruit on it of an excellent quality that it has ever borne. The orchard is about thirty-eight years old. [Applause.]

PRESIDENT JEFFREY. Mr. Stuart, of San Diego county.

MR. STUART. We have a good many orchards down our way that run from eighteen to twenty-six years old, and where the soil conditions are good and the man knows how to take care of an orchard, there has been no deterioration. There has been deterioration in the acreage and in the output of that county, but that has been largely due to planting on poor soil, and then, unfortunately, a few years ago, we were one of the counties that it didn't rain on for about six years. But where the old orchards are well taken care of I don't see any necessity in that county for the people to worry about any unknown disease. [Applause.]

PRESIDENT JEFFREY. This little introductory was intended just as a sketch. I am afraid we are up against the old proposition, though—afraid of a confession. I would rather have heard Mr. Pease and Mr. Cundiff and all my old friends get up and tell just exactly what some of those orchards look like. Tulare county is a very young citrus county. Mr. Schultz, of that county, wrote me there was great need of something being done up there, and I have hundreds of letters, perhaps fifty from men here, stating that there is something wrong and we must get together and investigate these things, but you would hardly suspect it from these reports. They are the health officers of the county. They are doing their part, but there are things that they can not reach. They are fighting the insects in good shape. You know what Mr. Pease is doing over here; but I don't believe they have told us anything about the sick trees.

MR. DREHER. If they want to see some pretty sick trees I can show them here within a few miles, trees twenty-five years of age that are dying, and have had the best of care. The gentleman is a small grower and has nursed his trees like he would children.

PRESIDENT JEFFREY. Is the Committee on Order of Business ready to report?

MR. CHIPPENDALE. *Ladies and Gentlemen:* The following is the program which the committee recommends for your adoption:

ORDER OF BUSINESS.

Your committee respectfully recommend that the convention, after the introductory proceedings, consider:

1. Whether there is a considerable decline in the production of the citrus groves of the State.
2. If so determined, to assemble at this conference for publication all the information, discussion, and experience possible as to the causes and effects of such decline.
3. To take steps to produce a broad and comprehensive investigation of the adverse influences that may be operating in our citrus orchards.
4. To make specific and unmistakable declarations that shall set forth the citrus fruit business in its true light, giving the public, and also the officials connected in any way with the economics of the citrus fruit trade, a candid statement of both the favorable and the unfavorable conditions of the industry.

5. The committee recommends that the discussions be confined clearly to the point under consideration in each case, and that all immaterial and purely local matters be left out of consideration.

6. The committee further recommends that all discussions purely argumentative be eliminated.

7. That every delegate be urged to take part, but to give his ideas in short, terse form, and to the point at issue.

8. That speeches, discussions, and statements be limited to ten minutes each, unless time is extended by vote of the convention, excepting those presenting formal papers or addresses.

9. We also recommend that the Committee on Resolutions, if necessary, have their resolutions ready to present at the close of each subject, so the business of the convention may be carried through with dispatch.

WM. CHIPPENDALE,
EDGAR A. WRIGHT,
WM. C. FULLER,
Committee.

MR. CHIPPENDALE. I would move the adoption of that order of business, gentlemen.

The motion was duly seconded.

A motion was made to amend by limiting speeches to five minutes instead of ten, as reported, which motion unanimously prevailed, and, as amended, the report of the committee was adopted.

PRESIDENT JEFFREY. The next thing on the program is "Botanic View of the Orange," by S. B. Parish, of San Bernardino. I will say that Mr. Parish is a contemporary of Asa Gray, the greatest botanist America ever produced. Even in his older age, he has prepared us, in the form of a letter to be read before this convention, something that becomes very suggestive; and Mr. Ernest Braunton, another botanist, will read that paper to the convention.

Mr. Braunton read the following letter:

BOTANIC VIEW OF THE ORANGE.

By S. B. Parish, Systematic Botanist, San Bernardino, Cal.

Mr. J. W. Jeffrey, State Commissioner of Horticulture, Sacramento, Cal.

It is with regret that I find that my engagement will not permit me to accept your invitation to take part in the conference you have called to meet at Pomona to discuss the condition of the orange orchards of the State. The matter, however, appears to me to be one that should be considered primarily by practical horticulturists, rather than by botanists.

If orange groves are deteriorating it must first be ascertained if there are not reasons to be found in unsuitable or insufficient cultivation, in irrigation or in soil fertilization. Soils may be unfit, either in themselves, or by reason of a hardpan, which may prove injurious when reached by the roots. The immediate and secondary effects of frosts and cold must be considered. Again, local conditions may in some cases afford an ample explanation, as in the "cement zone" near Colton, where the opaque incrustation deposited on the leaves prevents them from manufacturing sufficient plant food for the trees, and is the evident and certain cause of their distress.

If, after these accountable cultural and local causes have been eliminated, there is found yet to remain a considerable number of groves, well situated and well cared for, which are yet deteriorating, the cause might be reasonably considered to lie in the nature of the orange tree

itself. Such questions would then come up as to the age at which trees show deterioration, and the exact way in which they show it; the differences, if any, manifested by different varieties and by different stocks. It is only when in possession of exact information on points such as these that a student of plant physiology would have the necessary basis for investigation.

But a few general considerations may not be out of place. The orange tree is no exception to the universal law that all organizations have their periods of youth, maturity and decline which may be measured by days or by centuries. Good authorities place the productive period of the orchards in the orange growing regions of Europe at from fifty to eighty years, so that it is hardly probable that even the oldest of our trees have reached an age at which their productivity would materially diminish. Again, it is the fact, I think, that a budded or grafted tree is usually shorter-lived than a seedling. This is markedly the case with the peach and the plum. Doubtless varieties might be selected and propagated which possessed the property of attaining a great age of productivity, but our choice oranges have been selected for the quality of their fruit, without inquiry as to their longevity. An investigation of the behavior in this respect of different varieties might prove of value.

It must also be remembered that our most valued oranges and lemons are, from a physiological point of view, monstrosities. They are abnormal because they lack seeds, and they are seedless because the flower is incapable of being fertilized. The rule is, that unfertilized flowers produce no fruit, or only abortive fruit. It is well known that some varieties of pears are very unproductive unless grown with others that supply a more potent pollen, which, carried by bees, fertilizes the varieties whose own pollen is imperfect. In the peach unfertilized flowers either fall off, or produce small, abortive fruit. The Zante grape is incapable of self-fertilization, and produces the little seedless "currants" of commerce, but if fertilized by the pollen of other varieties bears a seeded berry larger than the finest Muscat. Now, while our seedless citrus fruits appear to be exceptions to this rule, may we not, from its operation, expect to find at least some uncertainty in their productiveness.

This might especially be suspected to be the case with the navel orange, which, in addition to its seedlessness, is doubly an abnormal fruit because it is, in reality, a consolidation of two oranges, one rudimentary, situated at the navel end of the other, and, in fact, causing the so-called navel orifice. Usually it consists of some vestiges of epidermis within the navel opening, but its real character is very evident in some of the "freaks," when the imperfect secondary orange may be often found exterior to the principal one, and may even contain some pulp.

It is believed, I understand, by some orchardists that the Washington navel tree degenerates into the inferior Australian navel. Assuming that these are two actually distinct varieties, and that one is not giving the latter name to coarse grades of the former fruit, it would require very conclusive evidence, carefully sifted for the elimination of error, to convince a botanist that such degeneration actually occurs, since it is quite contrary to the facts in plant life with which he is

familiar. Evolution, whether by slow selection or by sudden mutation, does not change the varietal character of an individual by reason of its age or other condition. These may cause a plant to produce inferior fruit, but not fruit of a different variety. The production of varieties is from an offspring which exhibits differences distinguishing it from its parents. The idea that an orange of one kind degenerates into another, like the old belief that wheat degenerates into chess or cheat, must be the result of inexact observation.

The orange growers of California are an unusually intelligent class of agriculturists, and we may be confident that their discussions at the Pomona meeting will supply us with much valuable information concerning the character of the orange tree, and the best conditions for its successful culture.

PRESIDENT JEFFREY. If any one would like to discuss this paper we will try and wedge in a little discussion as we go. Does any one wish to add anything to the paper?

MR. BEERS. I would like to inquire if it is observed that seedling fruit or other fruits than the navel ever bear sports of the navel form?

MR. KOETHEN. It is undoubtedly a fact that all the varieties of orange bear more or less navel fruit. Especially is that the case with the blood orange. It is a common belief that they come from the navel; I don't think that is the case. I believe Mr. Parish has struck an important fact there, that many of our navels, so-called Australians, are really only sports from real navel trees. The large percentage of nursery trees that have been rebudded into Washington navels, supposedly Australian, originally had their origin in sports.

MR. FULLER. I am perfectly satisfied that the Australian type of navels is a deterioration from the Washington type or the Riverside type of navel. From my view of the Washington navel in Florida, which have almost all gone into the Australian type of navel, I say the facts, as far as I can see them, outside of the law of theoretical botany, would prove to me that the navel puts on as one of its sports the Australian type of orange.

MR. DEWEY. After about eighteen years of actual experience I have found that there is a deterioration of the navel tree. That tree may be a good tree for ten or fifteen years, one of the very best. All at once we find that it has deteriorated into the Australian. After deterioration absolutely takes place there is no way of reclaiming that tree (illustrating at blackboard). This represents the form of the seedling tree in Bahia, Brazil. This represents the navel sport. Now, we will erase that sport. Here we have the navel tree. Any navel tree, I care not where it is from, unless you remove those two it will deteriorate. Now, we will say there is a nursery stock. It is immaterial whether that tree is headed that high or that high. If that is one continuous growth from the bud to that crown, it is a tree that will deteriorate in early life. If that tree is a two-year-old bud on a four-year-old root, naturally that is removed to there (illustrating), when we come to set that tree, in order to balance up for these little roots that have been cut off. Wherever a limb has been made out of suckerous growth it deteriorates in early life. If you find that that tree has made from the bud a growth one third way or one half way

to the crown, denoting two growths or three growths; if you have three separate growths in that tree you will have a good tree, but if that tree runs from the bud to that crown without making a second growth I advise you to leave it alone.

A MEMBER. Your idea is that a retarded growth is going to make it a good navel tree?

MR. DEWEY. Yes, sir. A suckerous tree will deteriorate in early life. These limbs come out originally and make your tree. The limbs must turn down right from youth. We will find that after the orchardist sets his tree little shoots will start all up the body of the tree and some of them come up here and usually went around here. You pull off some of the head of that tree and you say, "Well, I have pulled these suckers off; that will be all right; that will fill out this top." The result is that these cut off come up here. This wood is drowned out. Your sucker has a top and after the first signs of deterioration, it may be in four or five years and may be in ten years—the first signs of it is a line in the top. That gives you warning. When you see that line take that sucker out. The second year it takes the line this way and the third year this way, and there is your Australian tree left, and there is no other way of getting out of it. [Applause.]

MR. HAMBURG. I believe the cause of the Australian navel is the man that takes the bud. If you take buds from the sucker of a tree you are going to have Australian navels. I can grow a tree and make a dozen growths and can not make four feet, or I can grow it in one year just by cultivation and irrigation. If you irrigate your trees thoroughly and cultivate them they will continue to grow. If you give them a little water they will go dormant a little bit and then stop growing. I think it is altogether in selecting buds. As far as Australian or sucker growth of trees, if you select the buds from them I think you are going to have Australian.

PRESIDENT JEFFREY. We are not trying to decide here whether a Washington navel will become an Australian or not.

MR. BOYD. I believe it is generally conceded by those who know, that the Australian navel and the Riverside or Washington navel are both from the same origin. I have talked with Australians and they tell me that it was when vessels took six or seven months to go to Australia, they would call at Bahia, on the coast of Brazil, and get the buds, but they are distinct now. How it is I don't know, but they are both from the same origin, that is, from Bahia, in Brazil.

PRESIDENT JEFFREY. We are not trying to settle the origin of the two trees. We know that we do not want a bad orange tree. Now, Mr. Maskew, as secretary, will read a paper written by Mr. William Wood, of Whittier, upon seed selection.

Mr. Maskew read Mr. Wood's paper, as follows:

SELECTION OF SEED AN IMPORTANT FACTOR IN LAYING THE FOUNDATION FOR A CITRUS ORCHARD.

By William Wood, State Quarantine Inspector, Whittier.

It has been said by many growers who have observed the growth and fruitfulness of citrus orchards in southern California in the past twenty-five or thirty years, that citrus orchards of the more recent planting do not thrive and yield as good crops as did orchards of the first planting—age of orchards being equal; that citrus trees of the first planting were not nearly as subject to disease as they have been in the later planted orchards; that in orchards of the more recent planting, many trees begin to decline and the fruit to deteriorate at a much earlier age than did the first orchards; and that this decline and deterioration has been quite noticeable in many of the later planted orchards where the natural conditions were apparently good, and in many of these orchards the care has been better than was given the earlier planted orchards. If these statements are true, what has brought about so radical a change? I do not think such a change should be laid to any one condition. It must be remembered that citrus orchards in the past thirty years have been planted on most all kinds of lands, often where the conditions were very unfavorable, such as heavy soils underlaid with clay or hardpan and with poor drainage; soils underlaid with sand or poor gravel; soils that have been cropped and impoverished with wheat, corn, barley, etc.; soils that never had sufficient of the needed elements to sustain an orchard for a great length of time. Improper irrigation, such as holding water in basins; allowing the soil to bake under and about the trees; allowing the trees to suffer for moisture for a long time and then forcing them with water and fertilizer. Under such treatment I have known orchards where many trees soon develop gum disease.

All these are conditions unfavorable to the healthfulness of the orchard trees, but back of all this, may there not have been a hereditary weakness transmitted from the parent tree, that has made a large per cent of the trees susceptible to such diseases as we find common in the orchards of to-day, and must we not look for some of the possibilities of improvement from carefully selected seed?

Under the conditions I have named, we often find good healthy trees yielding good crops of fruit, while the nearest trees growing under the same condition are weak, diseased, dead or dying. In such a case it would seem that some trees are weakly constituted and are more susceptible to disease than others. Now, when we consider what kind of seed stock trees are grown from, is it any wonder to you why we have so much weakness and disease in many of our orchards?

In laying the foundation for a citrus orchard, we can not place too much stress upon the importance of the careful selection of seed. I believe the seed should be one of the first considerations. If we save seed from fruit known to have grown on good, old, healthy seedling trees, we may reasonably expect much stronger, healthier, and longer-lived citrus orchards as the result. It may be said that there is no certainty that the trees will all be like the parent trees because of the cross-pollenization. From my own observation I have found that this

is only true to a very slight degree and that seedling orange trees produce after their kind almost invariably.

Let us compare the foundation we have used in the past twenty-five years with that known to have been used in the first orchards planted in California. I have not much data as to what kind of orange trees the seed plants were grown from, but I have good reason to believe that the seed did not come from the poorest fruit that grew, as has been the case in the later planted orchards of California; but rather from decayed oranges such as were found in the markets of San Francisco, which was probably the best fruit grown in the Hawaiian Islands, or the countries from which the fruit came.

I think that every one who has been connected with the growing of orange seed-bed plants will agree with me that all sweet orange stock grown in the past twenty-five or thirty years have been propagated from a very large per cent of the poorest of seed that could be had—from the poorest seedlings, budded fruit, and a large portion from sick and weak trees. I think I can make myself better understood by explaining how orange seed is obtained.

In the later years, nearly all orange seed has been gotten from cull seedlings or any oranges that have seed in them, such as are thrown out at the packing houses for culls. A large per cent of these culls come from sick, diseased, weak, and dwarfy trees. If there are any such in the orchards, the fruit almost invariably is picked from them and brought to the packing houses with the best. When the fruit is sorted, a very large portion of this fruit from the sick or diseased trees is thrown into the culls, consequently a large per cent of the seed comes from the very poorest and weakest trees in the orchard.

Now, if the weakness is hereditary, and I believe it is, what may we expect if we go on planting trees from such stock? Who of you would knowingly plant the poorest seed of grain, potatoes, corn, or anything except oranges? Why, then, should we not be just as particular, and more so, in selecting orange seed?

It has been said by many California growers that sour stock is immune from gum and foot root disease. From my own observation I have found this not to be the case. I have seen a few cases where sour stock gummed quite badly. I have also had quite a bad case of foot rot in my seed-bed nursery. In this case the condition was caused by heavy soil and too much water, and the rot affected both sour and sweet stock the same.

In the past three or four years seed of the wild sour orange trees of Florida has become generally used by the nurserymen of California.

I understand the demand for this seed has been so great that all of this kind of fruit has been used for seed. Sour stock as a healthy long-lived stock upon which to bud has been very highly recommended by Florida growers.

I believe this stock is much less subject to gum and root rot diseases than such sweet stock as we have been using, possibly because the seed has been saved from all of the fruit and not from all the poorest as has been the case with the sweet stock seed used.

I believe if all of our seed were saved from the best trees instead of the poorest, we would have a much larger per cent of good, healthy, long-lived trees. [Applause.]

PRESIDENT JEFFREY. Is there to be any discussion upon Mr. Wood's paper?

MR. DEWEY. Mr. Chairman, I will take the same stand that he takes on the seed proposition. I believe the sour seed is most preferable. I believe the tap root from a sour seedling goes deeper in the ground, and I believe it would be better if all of us used the sour stock instead of the sweet stock.

PRESIDENT JEFFREY. I would like to say, in behalf of the office which I represent, that the reason we passed a special modification of the Florida quarantine, away along in the spring, was to allow the sour orange seed to be introduced into California, on the plea from the growers that it was a more hardy variety than the sweet seed gathered here in southern California. So we made a special order allowing that seed to be shipped into the State if it was shipped to the horticultural commissioners of the county and shipped in tight cases and there examined and fumigated by the commissioners. The reason of this was the supposition on the part of the growers that it was more immune from gum disease and perhaps produced a hardier tree. What effect it will have on the quality of the fruit in the future somebody will have to tell us.

MR. MASKEW. Gentlemen, it appealed to me, in reading the paper, that the point Mr. Wood desired to make was that the demand for Florida sour seed has grown so great that they take all the sour seed, good, bad and indifferent. I think Mr. Wood is present, and he ought to clear up that point.

PRESIDENT JEFFREY. Mr. Wood, did you make the point that they gathered all of the fruit from the tree for sour seed in Florida?

MR. WOOD. Yes, sir. I believe you could get poor seed or weak seed from sour seed as well as sweet seed.

MR. MASKEW. Is there any possible way of determining the seed, whether it is from good or from inferior fruit?

MR. WOOD. There is no way to determine the seed, but it is to determine the tree.

MR. BLANCHARD. The seed of the orange does influence the character of the orange. My orchard is an old seedling orchard, grown from the seed of Havana oranges. My neighbor planted some of those trees. He planted also some trees raised from the seed of Los Angeles oranges. He told me voluntarily that the first class of trees, that is, the trees raised from the seed of Havana oranges, were better oranges than the oranges that grow from the seed that came from Los Angeles.

MR. COLLINS. I would like to ask Mr. Wood if he has ever noticed any difference between the growth of the sour stock and the sweet scion; in other words, whether they keep even or whether the sweet scion will outgrow in growth the sour stock?

MR. WOOD. I have noticed that lately. Take yearling buds on the two and three-year-old tree; the sour stock will outgrow the sweet scion, particularly the limbs.

MR. COLLINS. I noticed in older orchards the sweet scion had outgrown in growth the sour stock.

PRESIDENT JEFFREY. Would that have a tendency to cause the tree to deteriorate?

MR. COLLINS. We assume it has; we don't know.

MR. BOYD. As one of the oldest growers in California, I can speak of a selection of seed in the early days. The seed in the early days was always selected, and always the best to be got. In fact, you could not get any bad seed; there were no packing houses and no culls. The greatest shipment came from abroad. Thomas Kelly and others imported 200 barrels of oranges to make seed of. That was supposed to be enormous.

PRESIDENT JEFFREY. Ladies and gentlemen, I take pleasure in introducing Mr. Charles R. Paine. Mr. Paine's article is "Renovation of Orange Trees by Systematic Pruning."

Mr. Paine prefaced the reading of his paper by remarks illustrated by charts. His paper is as follows:

RENOVATION OF THE ORANGE TREE BY SYSTEMATIC PRUNING.

By C. R. PAINE of Crafton, Cal.

The observer of plant growth will note that, in the ordering of nature, leaves are so arranged as to give the greatest possible exposure to sunlight and air. A growing tree of any kind, in a state of vigor, has the most active growth in the terminals of its branches, the top branches increasing faster, until the tree attains its normal height, while the lower branches, especially when trees are crowded, gradually weaken and die. This is particularly noticeable in forest growth, where the fir tree bears its cones only on the topmost branches, and in pines, where the branches higher up produce their cones. Among the multitudinous blossoms of the orange tree, on the new spring growth, it can be fairly well predicted which particular blossom will mature to fruit, for it is at the very ends where most plant food is being made. The law, that favoring conditions of growth are found in exposure, universally applies. In cultural conditions, where the orchardist is in control, it is policy, therefore, to secure the largest possible number of such points of life activity in obedience to such law.

A young orange tree and one approaching the maturing stage can do fairly well without asistance in modifying its form, but in the latter, the maturing stage, it is time to interfere to secure the ultimate health of the tree and future profit.

In the orange tree, the vigor of its growth under usual stimulating conditions, a heavy foliage and fruitage is produced, with the result that branches above smother those below, shutting out from them the normal supply of air and light, without which they suffer and ultimately perish. While the tree is young, and not of large circumference, these influences are so near to the poorly situated leaves, that their suffering is less and little noticeable; but, when the tree becomes of larger proportions, it is inevitable, that, when untended, the smothered branches become of little value and finally die, in which process of gradual decadence they are rarely of use themselves and become hindrances to the more profitable parts of the tree.

The plain inference from these conditions, if the grower desires to profit by obedience to natural law, though he may have no special knowledge of plant physiology, as a science, is to cut out such failing branches. The sap flow to them is lessening daily; the bark color is darkening; the

master branch becomes bright and vigorous and the flow of the life fluid makes active growth but an inch or so along the old channels.

This should be done as soon as the weakened state appears, for when they are dead and dry they have little or no effect in shading or hindering air circulation, but offer mechanical obstruction only. If the work of removal is done while such braches are still green, the beneficial effect is apparent to the good branches remaining, which get the needed exposure. The good branches thus relieved are, however, subject to the incubus of one or more lively shoots growing upon them, which must be taken off before they do mischief to their mother branch, for their upright growth gives them advantage of position and they would dominate the branch that is best for fruiting. If, however, they are not aspiring, but modest fruiting growth, they may be considered as part of the principal branch. Not so, however, those strong, rank-growing suckers that issue from the trunk, or on main limbs near their junction with the trunk and shoot upward with an intensity of energy as if to become the whole tree. They would, indeed, if unmolested, change the character of the tree in its regular habits of moderate growth, accompanied by the production of the finest quality of fruit, which should be the result of cultural conditions. These exuberant parts are not needed for tree renewal, unless one is willing to give up direction of growth and submit to the wild ways of nature. Cut off, then, these intruders, before they suppress the activities of the parts they grow upon, which bear the nobler fruit, and which in time they would supplant.

When a large orange tree is made clean on the inside, that is, hollowed out by the process of breaking and cutting out the dead twigs and branches, it is obvious that little or no good is done, so far as providing for access of light and air; neither does good, but rather harm ensue from the practice of clipping the outer surface of the tree unless a more shapely appearance is considered the object, for the head of the tree is closed by the succeeding growth to important natural influences. Of course, there can be no objecton to cutting off large protruding parts, or dangling limbs.

Each limb, so treated, completes the pruning of the tree at this stage of its life, provided suckers have been kept out, and cross limbs eliminated from the beginning.

The work thus far described, keeps the tree of middle age, in good condition, in constant thriftiness, because neither the younger parts, nor the used-up older have been permitted to interfere with the best parts.

Then there comes a time when the tree has the appearance of age, the signs of which are enfeebled growth of the ends of the limbs, especially of those directed upward. This is shown both in the yellow and smaller foliage and in the inferior quality of the fruit. The leaves, when not wholly yellow, are green only in the veins, or for a little distance on either side. Life forces persist longer in the veins because they have a fibrous, more woody structure than other parts of the leaf blade. This small proportion of the whole leaf surface having green parts, chloroplasts, which alone have the power, under the influence of sunlight, of food manufacture, contributes very materially to starvation of the tree. This may go on so far that, in the natural course of

things, the whole exterior of the tree is surprisingly thinned by lack of good growth. It is surely an alarming state of decadence.

Among the causes of the failing condition of the outer parts of the limbs are soil washing by concentrated rainfall or careless irrigation, or lack of sufficient humus material. These causes we may know. Others exist, like unsuitable proportions and quantities of fertilizing material, which have to be guessed at. So, of soil tending, which may have been too deep and too frequent in light soils, resulting in burning out the humus and too shallow or too infrequent or untimely cultivation in heavy soils. Whatever the cause which our scientists and practical orchardists must unitedly study and work out, a remedy, for a time at least, is naturally found in resorting to a more robust location of growing and fruiting points upon the still vigorous larger parts within the head of the tree. The tree has the opportunity for revival by the openness brought about by the exhausted and feeble growth of the outer parts. Upon these larger parts of the limbs, and from the trunk appear, under what must be favoring conditions, new shoots with large leaves issuing from newly-formed fruiting wood. The tree is then made up of two quite opposite features, a healthy, vigorous interior, productive of merchantable fruit, the outside portions of the same limbs, bearing some fruit of inferior grade; and other parts of the same being useless brush of which the neglected tree can not rid itself.

The work described, as belonging to the first stage of pruning, postpones the deterioration of the branches, if it has been begun in season, and been periodically performed by intelligent labor. But when this serious alteration in the condition of the tree, now so prevalent, is coming on or has been reached, a new practice becomes necessary, which is based on the same elementary principle as the first; namely, free access of atmospheric influences.

It may be said, by the way, that basic principles are the only reasons entitled to respect as foundations for methods of work.

The failing top branches afford a vantage ground, incomparably superior to the side branches, where the first work is done, for the admission of air-contained food—carbon dioxide—and light unhindered, direct from the sky above, which is the agent for its utilization to provide the carbohydrates, sugar and starch.

Limbs, though large, that constitute the upright part of the tree, and branches that have formed an angle with them, may be freely removed, even though somewhat fruitful. The open space resulting from this seemingly severe pruning, though an irregular space, may be likened to an inverted cone.

When the cuts are made and the old limbs tossed out, the barren space that meets the eye seems like a waste, but it is, in reality, the battle-ground whereon the tree will regain new life. The proof that such is the case begins to come at once, for it is in the spring when the crop is off that the opening is made. Within the tree, what seems almost a miracle of change, takes place; along the side limbs from junctions to terminals cohorts of vigorous branchlets arise, their new leaves, broad and green, at work in food-supplying, as if the tree were again a sapling. Such new leaves are rarely marked with streaks of yellow, the indication of lack of ability to manufacture plant food.

The large parts of limbs, bare before exposure, become regions of

lively growth by the formation of adventitious buds. Here is elaborated sap in abundant supply in the bast lying between the bark and wood, which is the pathway of distribution of nutritive material or manufactured foodstuff. Not ouly is food here in circulation, that may be made into plant form by growth, but there is always an accumulation of stored food in healthy trunks and limbs and medullary rays, and the utilization, for growth that is beginning here for the first time, is the attractive force that draws it to the point of need. This accounts for the new development which receives the reserve until the new leaves can manufacture for themselves.

Intermingled with the short-stemmed, broad-leaved fruit growth, are a few new sucker-like shoots, especially where the cuts were made; these do not grow lank and long as do suckers in an unpruned tree, where the open spot of light they aim to pierce is small. These and such of the newly-formed fruit branches as would be in excess, especially those higher up, should be taken away, and the open space, once secured, should be maintained as the most important region wherein increased vitality can be gained.

Within the first season, and increasingly so in successive seasons, the new foliage throughout the interior as well as in the center becomes fruitful. The side limbs have impelling influences to growth, not alone at or near their extremities as at first, but all around them, and dead wood, once removed, can never form again.

When these excellent results are gained and the grower reviews the processes by which they were secured, he no longer laments what seemed destructive work in cutting out decadent limbs at the side and the top and is ready to subscribe to the policy of avoiding, in his business as a fruit grower, the distribution of nutrition to regions unproductive of good fruiting branches or fruit. He may, too, doubt the advisability of the plan to permit tree renewal by natural sucker growth, which also has its origin in regions of active sap flow and storage, to the detriment of regular branches.

It may be thought to be well enough to depend on the weight of foliage and fruit of aging trees to open the top enough to receive equal benefits with the artificial treatment described; but such benefits follow only in a minor degree and are temporary, because new growth in the top may be thrifty enough to soon fill such an opening and shut out the reviving agencies. Such dependence is not wise, for the space must be large to bring about the desired renewal.

Growth has its limits, and age will struggle for control; but there is still a third resort, by pruning, to rehabilitate a decadent orange tree and keep it well at work.

As has been said, the reservoir of vital force in that part of the tree above the ground is in the trunk and larger limbs; the weakness appears in their subdivisions, which have small and few yellow or variegated leaves. Since rejuvenation is from within, the poor old limbs may be cut back to points of vital force where new shoots have been made ready, by superior location from the work previously done, to take the place of the old. The tree is then new without as well as within.

When a grower with his best judgment and in due season, in the late summer and again in the winter, has provided sufficient available plant food, has put his soil in mellow tilth after the season's rains or irriga-

tions, and has avoided untimely applications of cold water at the critical period of the setting of the fruit, but has failed to provide in the tree itself extra supplies of growing points in stable locations, in so far he has invited crop failure; for, when the chill nights of spring arrive, and the dreaded June drop period of hot days and drying winds comes on, it is only in the most vigorous regions that the young fruit will have staying qualities. There is no drifting to success in orchard methods, yet seasonal influence will contend for victory, and sometimes reward the thoughtless.

The different processes, all performed in subservience to natural law, have kept alive and in constant use the vital energies, have provided new and better areas for fruit production with a scarcely appreciable delimitation of such area, contrary to the plan of total decapitation at occasional intervals, and, if soil and cultural conditions have been favorable, have left the tree to a green old age. [Applause.]

PRESIDENT JEFFREY. Professor Coit, of the Pathological Laboratory, will now read a paper entitled "Relation of Asexual or Bud-Mutation to Decadence in Citrus Trees." [Applause.]

MR. COIT. *Mr. Chairman and Friends, California Fruit Growers:* I have a short paper which I think will take about ten or twelve minutes to read, and to-morrow, some time, if you wish, I will show the charts which are intended to illustrate this paper. It will take, perhaps, ten minutes more to show the charts. As the subject of my paper appears on the program, it is "Bud Variations," but I would like to change it to "Bud-Mutation."

THE RELATION OF ASEXUAL OR BUD-MUTATION TO THE DECADENCE OF CALIFORNIA CITRUS ORCHARDS.

By Dr. J. Eliot Coit, Assistant Professor of Pomology, University of California.

It is now coming to be generally recognized that there are, broadly speaking, two kinds of variation in plants: first, true variations or small unstable differences (only slightly transmitted to offspring), which may be due to one or several of three causes; viz., crossing, change of environment, and change of food supply.

When sexual union takes place between the male pollen cell and the female egg cell of the blossom, the nuclei fuse together and in the rearrangement of the nuclear matter in preparation for subsequent division and multiplication of the cells, there is an opportunity for a reshuffling of the cards or a redistribution of the characters which go to make up the new individual. Thus, we find that crossing is a most potent cause of variation, especially when the male and female cells are unlike in many characters. But as our citrus orchards are no longer composed of seedling trees, we are not concerned with variations arising from cross-fertilization.

Another important cause of variation is change in environment. A standard variety of corn will mature in a less number of days when grown in Wisconsin than when grown in Alabama. The Baldwin apple grown near Phœnix is very different from the Baldwin grown near Rochester. Furthermore, change in environment affects all the individuals of a variety. Thus the Washington navel orange from Florida reacts to our California environment by producing more acid, better

shipping qualities, and a better color. All the navel trees brought from Florida may be expected to react in the same way. Should navel trees be sent from California to Florida, however, they would be expected to again display the characteristics associated with the Florida environment. Thus we see that when dealing with clons or varieties propagated by asexual parts such variations can hardly be responsible for the alleged decadence of our citrus varieties.

In like manner, we find that all parts of a clon react in much the same way to a change in food supply, and however important such variations may be when dealing with annual plants, I do not hold them responsible for the wide divergence of types observable in our standard varieties of citrus fruits.

I would, therefore, call your attention to another kind of variation to which De Vries has given the name "Mutation." Mutations differ from variations in being more pronounced in character, in appearing suddenly, and in being at once the starting point of new forms which may transmit their characters to succeeding generations. We have available for study an enormous amount of data shedding light on the causes of variation, but the causes of mutations are still shrouded in obscurity. We may, therefore, leave the causes of mutation to the scientists of the future, and devote ourselves to a consideration of the fact of mutation and its relation to the strange divergence of types in our citrus orchards of to-day.

Every orange tree in its last analysis is found to be composed of cells which are the ultimate units of vegetable life. There are many kinds of cells, but for our purpose we will consider only the vegetative cells of which the entire growing part of the plant is composed, with the exception of the sexual cells located in the blossom. As explained above, the sexual cells contain the machinery for reshuffling the cards of heredity, while the vegetative cells usually divide in a simple manner, giving rise to daughter cells containing the same inheritance as the mother cell. We know that a bud cut from any part of an orange tree will produce a tree with characters like the mother tree, and it therefore follows that every cell in the tree contains, wrapped up in its nucleus, all the characters of the variety. Occasionally, however, it must happen that in some way the dividing vegetative cells allow their hereditary characters to become confused and daughter cells are produced which differ from the mother cell in having a new combination of characters. Whenever such an occurrence takes place in cells composing the apex of a bud, it is easy to see that the resulting shoot would be composed in whole or in part of these new cells, and should the dominant character of this shoot differ from the other shoots on the tree we would at once recognize a sport or bud mutation. Should we take buds from this sporting shoot they will develop into trees showing the new characteristics.

In some varieties this bud mutation is comparatively rare. It has required no great amount of care to propagate the Northern Spy apple true to type for 110 years. The Valencia late orange seems to show comparatively few mutations. I will say, however, that of all the clons to which I have paid close attention, I know of none which even approximate the large number of mutations of the Washington navel orange. We hear complaint on every side of the divergence of type in the Washington navel. If you go out into the average navel orchard to select a

dozen perfect navel oranges true to old standards, you will be surprised at the amount of searching necessary. You will conclude that there has been deterioration in the navel orange due to a divergence of types. It is my belief that by far the greatest part of the divergence is attributable to mutation rather than to variation.

The next point upon which I shall ask you to focus your attention is that *mutations are fortuitous*, that is to say, they occur entirely by chance and can not be foretold. Moreover, they seem to occur without reference either to the economy of the plant or to the desires of man. The desires of man are often antagonistic to the economy of the plant. The chief function of the plant is to reproduce itself. The breeding of walnuts to increase the number of nuts produced is not only highly desired by man, but it is also in harmony with the best efforts of the plant. In the case of oranges, however, the efforts of man to restrict or prevent seed formation is directly contrary to the good of the plant, looked at from the plant's point of view. This has resulted in the case of the navel orange in such an artificial and unnatural plant that it is now entirely dependent upon man for reproduction. Mutation proceeds entirely without reference to any of these things, and we may expect three kinds of sports. We may have those which show new characters of great value. It is to the discovery and propagation of such desirable sports that the hope of our future citrus industry rests. We may also expect a large number of sports which may be classed as neutral. They may show new characters which may be neither objectionable nor valuable. We may, likewise, expect a large number of sports which show new characters which are decidedly retrogressive and objectionable. It is here that we find the answer to the oft repeated question, "Why are my navels degenerating?" Bad mutations have been occurring in our orchards for years and we have failed to prune them out. We have not been alive to the subtle changes which have been taking place.

Retrogressive mutations in orchard trees, however, can not account for all of the enormous increase and wide distribution of poor types. There is another all important factor in this process. You know the man who is ordinarily employed to cut bud wood for propagating purposes; he may be as honest and sincere as any one could wish, but I think you will agree that very few bud cutters have any accurate knowledge of mutation and the principles which underlie it. They are likely to, and in many cases do, innocently cut hundreds of buds from mutating shoots, with final results which can easily be imagined. Too many people think that badly shaped oranges are alone caused by some irregularity in the soil or available plant food, and that trees propagated from such wood will produce ideal fruit when grown on different soil. It is our duty to combat this idea. Soil and plant food may cause variations; barren soil will cause small oranges; a superabundance of organic nitrogen may cause coarse, thick-skinned, puffy fruit; but, so far as we know, these things have absolutely nothing to do with mutations, which occur suddenly and without warning.

In order to keep our orchards true to the best type of navel we should proceed along two lines of effort. First, by very careful pruning. Our pruners must recognize the fact of mutation and be alive to its subtle workings. They must be quick to see and cut out all branches

sporting toward poor types. In the second place, we must be exceedingly careful in cutting bud wood. It may be easy to get wood from the fine, plump, vigorous growths of young trees which have not yet come into bearing, but the practice is a very dangerous one. What if one of these young trees came from a bud innocently cut from a sporting branch? Make it a practice to cut buds from bearing trees when the mature fruit is on and select buds from those branches which produce your ideal of the navel orange. Perhaps you could not put in your time to better advantage than to spend weeks, if need be, cutting your own bud wood, and, if you wish, delivering same to your nurseryman to be grown on contract. You would not dream of sending your hired man-of-all-work into a large herd of cattle to select breeding stock. Then, why should you allow irresponsible men to cut your bud wood?

But while bud mutations may be in part responsible for the alleged decadence of our citrus groves, they may at the same time, as previously suggested, be the hope of our future citrus industry. These mutations are fortuitous; they not only occur along lines of retrogression, but on lines of progression. As pointed out, the qualities most desired in oranges are antagonistic to the objects of the plant's existence, and we may, therefore, expect the number of undesirable mutations to greatly exceed the desirable ones. Citrus breeding by crossing species and the production of such hybrids as the Tangelo and Citrange may be very desirable for some of the Eastern States, and of great scientific interest to Californians, but our industry is based on two or three well tried varieties which will hardly be superseded. We do not regard them as perfect, however, and it is by the discovery and propagation of desirable mutations that we would improve them. Marked mutations along desirable lines are rare, and all honor to the man who has the eye to see them and the presence of mind to preserve them.

We need a Washington navel which will sweeten earlier and one which will remain good later. We need a navel which will hang on the tree like a Valencia, one that is not subject to splitting, one for the Tulare county which will not sunburn, one which will not puff, and one which will stand more frost. We need a Valencia which will not turn green again and which is entirely seedless. We need a Eureka lemon which will not throw out such ungainly long branches and which will produce an even greater amount of summer fruit. It is my belief that mutations of this nature are occurring in our orchards all the time, but searching for them is like "looking for a needle in a haystack." For the man who will find them and propagate them there is awaiting both honor and financial reward.

SUMMARY.

To sum up then the ideas which I would leave with you I will say that I believe:

(1) That a part of the decadence in our orchards is due to divergence by mutation into undesirable types.

(2) That these mutations are not like the variations caused by crossing, food supply, and environment, but are fortuitous and beyond prediction.

(3) That these mutations may be retrogressive, and may in time, if not checked by intelligent pruning and bud selection, cause our orchards to become a heterogeneous jumble of bad types.

(4) That they may occasionally be progressive, and if such instances are discovered and the desirable sports propagated and studied, a wonderful improvement over our best existing types may be in store for the future. [Applause.]

MR. GLASCOCK. We are advised not to cut buds from these shoots; we are advised not to select them from suckers. How can we identify first-class wood?

MR. COIT. If you can find a branch which has ideal fruit on it, select your bud, even if you have to use some angle wood.

PRESIDENT JEFFREY. How is he going to get his nurseryman to do that?

MR. GLASCOCK. I have about 300 Australians that I propose to bud. In order to get good buds I have got to take them off the sucker.

PRESIDENT JEFFREY. Now, Doctor Coit, there is the gist of the meeting. That gentleman is going to do something that will cost him thousands of dollars. It may be absolutely necessary for him to do what he is intending to do: it may be folly for him to do that thing. That is one reason we are here to-day, Doctor Coit, to find out whether he should renovate his trees by budding over, or to have it found out for us.

MR. GLASCOCK. These are what are commonly known as Australian trees.

MR. COIT. If they are, I should bud them over.

PRESIDENT JEFFREY. How are we going to find out whether they are?

MR. COIT. If they are an undesirable type, if they are unsatisfactory, I should bud them over, whether they are the Australian navel or some other undesirable navel.

A MEMBER. Out of what experience do you arrive at this conclusion? Have you observed the rebudding of what we call Australian trees? Have you observed their having been rebudded and then observed for a number of years the character of fruit they produce, whether they did not deteriorate back to that condition?

MR. COIT. I will say that I am a young man and the most of my remarks are based on scientific literature and the publications of the scientific men of the day, but so far as my observations do go I have seen to it that I should say nothing that did not match up with my own observations.

PRESIDENT JEFFREY. You may have an undesirable type of trees right now. Rebud them to typical navels, selected on the doctor's plan. In ten years' time they may have gone right back to the point you are to-day. We don't know about these things and we must know to save you gentlemen money.

MR. STREIGHT. I want to say one word right here. I had five acres of what they called Australian navels. I budded them all over about six years ago and they are bearing as fine navels as are raised in Riverside county.

MR. DEWEY. I would like to answer a question. Mr. Glascock asked the question how to get buds. I want to tell you how to get buds. Never take buds off anything that is upright. Take your buds out of the foliage, never from anything that comes up from the crotches of the tree that was originally a sucker. Look and see if you can find one. You will have to look for them.

MR. JONES. In regard to budding Australian navels; is it necessary or is it advisable to bud an Australian navel to navels, or is it just as well to bud it to Valencias? I have had perhaps 20 or 25 Australian navels all budded over to Valencias. Some of them have been budded only two or three years, but they seem to be very successful and bearing heavily. Isn't it more advisable to bud an Australian navel to Valencias?

MR. DEWEY. In budding over it is immaterial what you bud to.

PRESIDENT JEFFREY. He asked whether it was advisable to bud an Australian tree to Valencias or to go on with the navel type.

MR. DEWEY. Either one.

MR. KOETHEN. As a practical budder, I wish to say this: that after five or six years of budding old trees over and always using sucker buds, I don't know of a single case of Australian navel turning up in those buds, but it was done in just the way the professor tells us to do. I avoided the trees that showed a tendency to mutation, and I believe it is criminal to cut a bud from any tree unless you know its history and know that it has never shown any sign of mutation. The question of suckers has nothing to do with it, is my experience. [Applause.] It is a part of the tree, and it is a sucker because it has not got the light to grow up. Professor Paine showed us that if you had a tree too close the wood will grow up to other light. If you thin out your tree you will have no suckers; you will have bearing wood inside your tree.

MR. SLAUSON. In answer to Mr. Jones' question in regard to budding Valencias or navels, from ten years' experience I would advise the Valencias. The Valencia, as a rule, will make a larger tree than the navel will when it is rebudded, either on a lemon or on an orange.

MR. PAINE. Mr. Chairman, there is a practical question involved there as to whether you will bud the navel or the Valencia. You don't want to bud to Valencias when you find scattered trees here and there. You are, in common sense, bound to bud them to navels.

MR. CALL. I have a question to ask Dr. Coit. I had in my grove that I planted out about fourteen years ago, 5,000 trees that developed into what we call Australians; that is, they are vigorous trees that raise coarse fruit, and I budded them over, selecting the buds with great care from well known bearing trees, marking them myself from thrifty trees, and out of those 5,000 trees 90 per cent are well defined navel varieties. The other ten per cent developed into something I have never had in the orchard before. It was a thick tree, full of branches, little shoots starting out in every direction from every branch, with so thick a top you could not get the sun into it. Those trees we kept pruned for four or five years, and after the first year's pruning we could get a little fruit, but it would be of all sizes and shapes and some with navels and some without. We finally gave that up. I took those trees, about 500 of them, hoping that I might by a stronger type save them, and I budded them over to grape fruit. The first year showed a good growth, the second year a poorer growth, the third year they developed into the same kind of a top, and I finally dug them up. Now, I would like to know what kind of type we had there. I noticed over in Mr. Slauson's grove several hundred such trees. I noticed another grove of similar type running all the way from three to ten per cent running into that thick type of tree. My neighbors have had the same

type and they have concluded, after fifteen years' experience, to dig them up. It does not seem possible to take any kind of a bud and develop afterward.

MR. COIT. It is very difficult to answer that question. I would much prefer to defer my answer until I had an opportunity to study the individual cases. From your description I can not account for it unless, of course, you had bad mutations occurring again and again. If you can have one bad mutation you can have two, of course, and the working over of an orchard into better form means continual oversight and continual watching to keep it true, or you are liable to have objectionable mutations even in those buds. The peculiar case that you mention, not having studied the individual trees, I can hardly account for without looking at them.

MR. BOYD. I would like to ask Mr Call whether he does not think that that depends on the stock?

MR. CALL. Of course, I could not tell that.

MR. BARNHART. If I had an orange grove I would be the last man in the world to rebud it if I wanted to change the variety with a mutative variety. It is a well known fact to all well informed men on plant life that it has a tendency sooner or later to revert to the original, and any man who will depend upon a type of that origin sooner or later will be disappointed.

PRESIDENT JEFFREY. I would like to have read a little resolution of about five lines, passed by the last State Fruit Growers' Convention, regarding the topics we are now discussing.

Mr. Maskew read the following:

WHEREAS, It is quite evident that in future our orchards must be bred up to produce fancy fruit, and to do this we must get rid of the scrub trees; therefore, be it

Resolved, That we each begin keeping a record of the production as to quality and quantity of fruit, behavior of tree, time of blooming and ripening of fruit, on any tree in our orchards that seems exceptionally valuable; and, after two years' proving, of continuous value and fixed qualities, these trees and records be offered to nurserymen for propagation as pedigreed fruit; and be it further

Resolved, That we encourage our nurseries to propagate only the best and most vigorous stock by refusing to buy "seconds" or inferior stock at any price.

MR. FREEMAN. In my experience with lemons more particularly, I have noticed in some years a grove will yield lemons that are quite under the ordinary, as far as grade goes, while the very next year, under no different conditions, it will yield lemons just the opposite in grade. I have noticed that in two groves especially. We have been wondering why that is, and if Professor Coit can tell us, we would be glad to know. Of course, it is a mutation, so far as the lemons are concerned. If we were to treat that fruit as a mutation we would simply cut the whole thing up from the roots. I could show you those conditions to-day, and they are most marked. Another thing I would like to ask is this. Why should a branch from a navel orange tree, yielding the very best kind of navel orange, superior to any other branch on the tree—why should that branch be called a mutation? That is the regular thing, it seems to me, and the other part of the tree is the mutation.

MR. BODENHAMER. This is very interesting to me. I have been twenty-eight years having more or less to do with orange trees and at this time, seventy years old, I am just simply a question mark. Per-

haps I can make a suggestion which seems to involve all these questions, mutations, of the variation of the bud, of the influence of the stock on the bud. Twenty-five years ago I bought at Pasadena navel orange trees budded on sweet stock. There had been no diversion towards wild growth; there had been no deterioration in any particular of those trees. They have borne all these years, fighting for their life, without water, without fertilization. They remain true to-day. I have cut off wagon loads of wood, still the fruit grew, no variation. I have bought stock from various nurseries, many Florida stock, a good many trees budded on the sour stock from Florida. Those trees reverted, many of them, to the Australian tree. Those trees have a habit of making a large tree growth. I have had some of those trees budded over. For a few years we would have a navel orange true to the variety of the tree we took the bud from, but some, in three or four, some in eight years, reverted back to the Australian navel. Of course, this is a question mark. I haven't settled anything. I know less than I did about it twenty-eight years ago, but we contemplate planting hundreds of acres up there. We want to start right in our boyhood days, and we have this idea, that the navel orange tree is a half dwarf, should be grown as a half dwarf, that any attempt to put it on a large stock and make it a big tree would defeat your purpose of fruiting. With this strong sour stock, finally the wild predominates over the bud. I am not giving you information but making inquiries.

The convention here adjourned until 7:30 o'clock p. m.

EVENING SESSION.

PRESIDENT JEFFREY. The convention will please come to order. While the delegates are coming in I would like to employ the time in discussion, in regard to the renovation of citrus trees by pruning. If pruning will restore the trees, will it be a permanent improvement or only for the time being? In other words, will it only last as long as the active root system is a little ahead of the foliage that you leave after you have pruned your trees for restoration? There is an old Gravenstein apple tree in Sonoma county forty-eight years old that this year had fifty-two packed boxes of apples. Every year that tree bears a full crop of apples. Why is it an apple tree will remain fruitful in old age without special care while your orange tree will not? That apple tree was rarely pruned.

A MEMBER. Is that apple tree in an orchard or standing alone?

MR. MASKEW. It is in orchard form. There were not only fifty-two boxes of apples on that tree but there were fifty-two boxes of No. 1, four-tier apples. They won the gold medal.

A MEMBER. What is the character of the soil for drainage?

MR. MASKEW. Excellent. It is more or less on a hillside.

A MEMBER. I don't know that apple tree, but I know some apple trees, and it strikes me that an apple tree does not have such a heavy,

overlapping, smothering foliage as an orange tree does, and there are natural vitalities, too.

PRESIDENT JEFFREY. Somebody told me to-night there were 12,000 acres in one county in southern California where, if the trees continue in the same condition they have for the past two or three years, those trees will not be profitable to the grower. If that is the case, we are justified in coming here.

MR. FULLER. I think it is fair to this convention that your informant should state something of the condition of those 12,000 acres.

PRESIDENT JEFFREY. As he told me this confidentially, I won't even name the county, but it is not a hundred thousand miles from Colton.

MR. FULLER. I can see, if there is a rise of the water table in such an area, that that might be sufficient cause why any tree should go out of bearing, whether it is an orange tree or apple tree.

PRESIDENT JEFFREY. Then shouldn't we have that investigated and know why they don't get some good out of those 12,000 acres? Isn't it just as much an advantage to have drainage investigated as any other proposition relating to decadence?

MR. KOETHEN. I don't think it is necessary to find out just where that 12,000 acres is. I know that last year—not this year just finished, but the year before—there were something like a million orange trees in California and a million and a half boxes of fruit, which only gives a box and a half to the tree, which is not enough to pay.

PRESIDENT JEFFREY. The citrus trees of Butte county—that is so far away that there can't anybody jump on to us—just raised three quarters of a box to the tree last year; that is about the average, and yet they have some very profitable orchards there; some produce three or four boxes, but the average makes just three quarters of a box. In the southern part of the State there are many orchards that do not produce that.

A MEMBER. What is the average age of those trees?

PRESIDENT JEFFREY. Fifteen years, say.

MR. BOYD. I am local statistician for the department in Washington in regard to fruits and farm produce, and a year or two ago they sent to me to furnish the total product of Riverside and also how much per acre, and I got my statistics from the county assessor of the bearing trees and the number of boxes. Any one can easily get it. What I made out from the actual figures and the actual facts was that the orchards of Riverside produced 100 boxes to the acre, and I don't think they produce as much to-day.

PRESIDENT JEFFREY. That is one box to the tree?

MR. BOYD. Yes.

MR. DREHER. I think Mr. Chase testified in the rate case that the crop was 105 boxes to the acre, taking the official number of boxes shipped by the railroad. It makes no difference whether it is 12,000 acres or 1,200, the fact is that the orchards are not producing as they ought to be, and the question is, do we want to know the cause?

PRESIDENT JEFFREY. Do you think we are justified in holding such a meeting as this to consider these questions?

MR. DREHER. I think so, and always thought so. There isn't a man within the reach of my voice but what thinks there is something radically wrong.

MR. BOYD. I would like to give you some other facts that would justify the calling of this meeting. I would say that I am one of the oldest growers in southern California and my orange grove is not paying expenses. I have a neighbor who took an orange grove that was run down and they put some work and some fertilizer into the orchard and they brought that up. There are two orchards adjoining me that have been abandoned because they don't pay. To be sure, one has been put into town lots. There are other places where you can't see an orange on the tree. I don't see why we get such reports as to 50,000 car loads of oranges. I don't care what they say about it, but that is the condition in my part of the country, and it is one of the oldest orange growing localities in the State. Some are under the new irrigating system. My own is under the old Riverside system. I believe my orchard can be brought up to a paying condition. If I did not have an income from other sources I would be obliged to go out of business, and there are a great many other people in the same condition. They send people up to the assessor who own good groves and they tell them what they make from their groves. They don't send me up, who don't get enough out of my grove to pay for the water. They send those rich men up to Sacramento and they tell the assessor what they make. If they send me and my neighbors we can tell what we make on our oranges, and that might have a little bearing on the railroads.

DR. OSMUN. I would like to ask the last speaker what the maximum amount of his crop was in the years gone by. I would like to see what the decrease has been and in how many years.

MR. BOYD. Originally I had thirty acres in oranges and the last year I had it I couldn't keep it because I had a mortgage. You know what that means. I got $6,000 off of my orchard the last time I had a crop. Since that time it has been going down and down. I only own five acres now and last year I got $200 off of it. You know you can't run an orchard without a hundred dollars an acre. No man will say that you can keep it up for less than a hundred dollars an acre.

PRESIDENT JEFFREY. Professor Rolfe of Florida says that too much pruning of oranges makes die-back. We have die-back in the Mills orchard right back of Pomona. There is a row or two of those trees that are dying in the tops. It is also up in the foothills of Pomona. Nobody knows what is the cause of it. Ought not we to pay some man five or ten thousand dollars, if necessary, to find out these things? Can the botanist help us any, Mr. Barnhart? Is botanical science of any value to us? Should we have a botanist in the commission that is going to investigate conditions here?

MR. BARNHART. *Ladies and Gentlemen:* I have been growing trees and plants all my life. I have learned some things in that time that it does seem to me will apply to the citrus fruit proposition that is being discussed here at this time. The first thing I wish to say on this subject is that there are fundamental principles that govern the growth and development of plant life that you dare not violate without paying the penalty. Now, let me begin. We heard to-day about stocks, about grafts, about disease, and all that sort of thing, playing an important part in the profit or loss of citrus fruit growing. If you will take time to study the situation you will discover that a seedling tree to begin with has two thirds of the tree underneath the ground and one third of

the plant is above ground. You take up that little tree and the first thing you do is to mutilate and interrupt the natural functions of the tree by cutting off the tap root. You begin to violate the first principles in the law of nature governing plant life. You put it next in a nursery row. You grow it carefully and the custom is to have a one-year-old top on a two-year-old root or a two-year-old top on a three-year-old root. In transplanting the little tree into the nursery the first process of mutilation is begun, and then, in order to recover and get back to its natural principles again, those roots go down, down, down and spread out, out, out. Then the orchardist wants his trees. The nurseryman goes at it with a sharp spade and he begins to ball it. He takes 90 per cent of the roots of that tree away and starts it out on its mission in life with that second mutilation of a more terrible character than he began with in the baby plant. This may be overcome. The tree will recover, if given an opportunity, from even that terrible ordeal. Then comes the desire to make the most out of the land. You will plant 100 to 110 trees to the acre, and then the struggle of life and death begins with the mutilated tree. It is true that the tree will not occupy the ground for several years, say four or five, and this feeding process goes on all over and the ground is permeated, filled with roots to maintain that tree. Then disease sets in in some form or another, and why? First, because of the mutilation begun with in the baby plant; second, in the mutilation in transplanting it in the orchard; and, third, its starvation. We should plant 50 trees to the acre. The greatest citrus fruit tree grower, I believe, in the world, confessed to me three years ago that 50 trees was all that an acre of ground should be planted to in order to be a successful, profitable citrus orchard when it was fifteen years old.

I am not a citrus fruit grower only in an experimental way. My business calls me over different parts of the State and I don't hesitate to inquire into the reason why this is so and that is so, and my observation leads me to believe this. As remarked in the address by the President, there are soils that are wholly unfit for citrus fruit culture. Then there are soils and orchards to-day that have become wholly unfit by the method of cultivation. When I first came to this State fifteen years ago I saw an orange grove of about 1,000 trees, maybe 1,500, that bore bountifully of the finest kind of crops. The soil was about 50 per cent little boulders about as big as my fist. They irrigated faithfully and in five years' time the orchard became so unproductive that they decided to abandon it and make firewood of the trees. A change of superintendents took place. The orchard belonged to a company of people who loved to experiment and had plenty of money to do the experimenting with. They gave the new superintendent free rein and the first thing he did was to buy the strongest plow that he could buy. He turned a 12-inch furrow about 15 inches deep with eight horses. He next secured a subsoil plow, the strongest that he could have and put ten horses on that and tore up the whole orange grove 3 feet deep. And will you believe me! That man hauled fertilizer from a packing house and stable manure 35 miles and put on that orchard—

PRESIDENT JEFFREY. Time is up, Mr. Barnhart. Anybody who can tell a bigger story than the chairman has got to be called down. I asked you a question and you have not answered it. Can the botanist be of any service in determining the causes of decadence in our citrus orchards?

MR. BARNHART. No, he can not.

PRESIDENT JEFFREY. Well, he can. Mr. Barnhart has helped us a great deal to-night; and he is a botanist.

A MEMBER. I move that the gentleman's time be extended long enough to tell us whether that orchard died or not.

PRESIDENT JEFFREY. Mr. Barnhart, you told us some very splendid facts and I thank you for it. You did not tell us whether they were planting that orchard for the benefit of China or the United States. The gentleman wanted to know if the orchard died.

MR. BARNHART. No. I want to tell you that I went up and saw that orchard. They had developed to a size of 15 inches in diameter and two years ago the frost killed those lemon trees to the ground and I had the pleasure of grafting them to navels this year, but the oranges were perfection themselves. Gentlemen, it was a pleasure to me to look on that rejuvenated orchard, with the most beautiful fruit, no scale, no soot, no dust, no dirt, 35 miles from the railroad.

PRESIDENT JEFFREY. Now, gentlemen, I would like for somebody that has been here for more than twenty years to give us five minutes' comparison, as to the trees from which buds are cut now compared with the trees from which they were cut twenty years ago. That is, twenty years ago all the orange trees from which buds were cut were typical navel trees. When you go out to cut buds, or your nurseryman goes out, does he cut from those same typical trees or have the trees gone into decadence so he can not get the buds?

MR. BOYD. One of the oldest orchards in Riverside, in fact, the original orchard, was budded with the buds that came from Washington. Ten acres of it brought in $10,000 a year. Recently, I believe, it has fallen into decadence somewhat. Mr. Cundiff can tell you more than I can.

MR. GRIFFITH. I have a tree that is probably four or five years old. It is budded from the trees in Washington, so it bears the relation of sister to the typical tree and I don't think Mr. Boyd could tell the difference between that tree and any other tree if he was in the orchard.

PRESIDENT JEFFREY. The question I was trying to get at was to get one on the nurserymen. Do they pay sufficient attention to the stock from which they take the buds? Here is a sister question: Do citrus nurserymen usually pay any attention whatever to the fall development of the tree from which buds are to be taken next year?

VOICES. No.

PRESIDENT JEFFREY. Do they have any pedigreed citrus nursery stock for sale in southern California?

MR. PAINE. There is one simple answer to about all those questions. We are an unscientific set of orchardists.

PRESIDENT JEFFREY. We have a movement on foot in the north to have a record kept of a number of deciduous trees there for five years.

MR. HAMBURG. I would like to say that I have a pedigreed tree and I have a pedigreed orchard, six acres, that came from Mr. Thompson's, and all the orchard of six acres is identically alike.

PRESIDENT JEFFREY. I was going to tell you of a nurseryman in the north who bought all the buds from a row of orchard trees. He is now advertising pedigreed stock. There were half a dozen trees in that orchard row that bore four or five times the fruit that the average

tree bore and they were marked by the owner. The nurseryman sent his foreman down there and he did not touch the typical trees because he found better buds on the trees which never bore. Now, that is the way too much of our pedigreed stock is obtained.

MR. HAMBURG. I selected those buds myself; I did not send any hired man.

PRESIDENT JEFFREY. That was for your own orchard?

MR. HAMBURG. Yes, and trees that I have to sell.

MR. PAINE. There is a question I would like to propound, which I can answer and others follow, if they will, concerning a decadence that occurs in the orchard from soil mismanagement. Everybody knows it as soon as I mention it. We irrigate and plow and cultivate in the spring time, but during the rest of the year along the rows where the water goes, you will find irrigated ground which once had good roots in it which have become neglected and have become sick and died. It stands to reason that if that has had no regular draining all through the hot summer months, no regular food supply, that condition would affect the trees. I know I can go in there with a pick and I can't get the water there without a great deal of labor.

PRESIDENT JEFFREY. Now, we will change the program and have a paper read by the Secretary, "The Physiological Effect of Windbreaks," sent down by G. W. Homans, State Forester. Mr. Homans is fighting fire to-night away back in the woods near Blue Canyon in Placer county, and has been for a week, and he is not able to be here. He has had this paper prepared for us in his office by Allen H. Hodgson, Assistant Forester, and he sends his regrets that he was not able to prepare the paper himself.

Mr. Maskew read the paper referred to, as follows:

THE PHYSIOLOGICAL EFFECT OF WINDBREAKS.

By ALLEN H. HODGSON, Assistant State Forester.

We of the State of California have been liberally dealt with by nature. Our resources are wonderful when compared with those of other states and countries. Our climatic conditions are so varied that we can produce nearly everything, from products demanding the most tropical conditions to those demanding severe frosts for best development. We depend upon our forest products, our mines, our stock ranges, and our agricultural outputs, as well as our climate, for vast incomes, which make our State one of the richest in the Union, and because of the diversified character of these resources we are made one of the most independent of states.

Nature has indeed been kind to us, so friendly, in fact, that we have almost reached the point of believing that our conditions can not be bettered by artificial means. This fact, however, should not be lost sight of because nature can assist in our development only by giving us conditions which make it possible for us to do for ourselves. Through artificial means, nature's gifts can, in many cases, be greatly improved upon.

Our State has so far flourished and advanced by depending chiefly on its natural resources which had, previous to our coming, been stored up for centuries unused. Because of our increasing population and the

greater demand upon our resources, we have now reached that stage in development where our condition must be bettered by artificial methods, which will assist our already prolific lands in producing a maximum yield. Our irrigation systems must be developed, our lands fertilized, and better species of trees, vegetables, and plants cultivated.

Along this same trend we have to consider the advisability of establishing "windbreaks" or "shelter belts" for the purpose of protecting our orchards and crops from undesirable climatic conditions. It is an established fact through casual observation and through organized experiments that windbreaks assist agriculturists and fruit growers in two well defined ways: First, by preventing the free sweep of strong winds from breaking the trees and creating severe atmospheric changes; and, secondly, by conserving and balancing atmospheric moisture.

In the State of California, especially within the Sacramento and San Joaquin valleys, both of these features are of prime importance, and should be given full consideration because of our severe north winds, which dry out and blight our crops and damage our orchards. These winds affect our agricultural pursuits in a number of ways—they cause great damage by breaking the limbs of orchard trees, by shattering blossoms, and causing imperfect pollinization. They dry out the buds and the growing young shoots, and in many cases cause the whole trees to die. It is not uncommon to see branches scalded by the heat and drying effect of these winds, and in many cases fruit is damaged on the windward side in such a manner as to spoil it for market.

In many cases crops of nuts, such as almonds, have been ruined, and we all know the effect of the winds upon the grain crops of the State—drying up and shrinking the kernels of grain while it is still in the milk, as well as shattering the grain after it has ripened and before it is harvested, thus in many cases decreasing the yield by a very large per cent.

In many parts of the State our orchards and crops are blighted by frosts, and large amounts of money are expended on smudge systems for protection against the cold snaps. Fruit buds can endure 2 or 3 degrees severer freezing when the air is moist, and so if we can devise methods of overcoming the evaporation caused by these winds we can greatly assist in solving the frost problem.

In experimental work on sandy lands in Wisconsin, Professor King found that, with a gentle breeze blowing, evaporation a foot above the ground was 25 per cent greater 20 rods out from the west edge of a field than it was 3 rods out. In this case there was a windbreak 12 to 15 feet high on the west side of the field. Even with only a hedge of scattered bur oaks 6 to 8 feet high, evaporation was 30 per cent greater 300 feet to leeward of the hedge than at 20 feet.

Not only does the land dry out much more rapidly with a strong wind blowing over it, but the finer portions of the soil itself may be blown away, greatly decreasing the soil fertility and lessening the power of the soil to hold moisture, for the finer the soil the greater its moisture-holding capacity. Also in many cases, winds carry sand particles which cut off young plants or cover them over. Another point in this connection is that under ordinary conditions of farming the finer particles of soil are brought to the surface every time the land is plowed or worked. The wind carries many of these away, so that the natural tendency of these soils, if allowed to drift, is to become coarser, less able

to retain moisture, and more subject to drouth. Besides, in these coarser soils, any vegetable matter that may be added in the form of green or stable manure is much more quickly burned out and the humus reduced to ashes than on the finer and more compact soil of the original field. This we do not want. For often a big yield depends upon there being a large quantity of humus.

It has been observed that crops in the Sacramento Valley on the leeward side of natural windbreaks have been preserved and saved from the damages of winds while other crops in the same vicinity which were not protected were ruined and lost.

The farmer of the Middle West has learned by experience the benefits of the windbreak, and orchardists have long known its value; but that crops in fields protected by timber-belts yield better than in unprotected fields, and especially that winter frosts are prevented by such protection, is not fully realized by farmers. By preventing deep freezing of the soil the winter cold is not so much prolonged, and the frequent fogs and mists that hover near forest growths prevent many frosts. That stock will thrive better where it can find protection from the cold blasts of winter and the heat of the sun in summer, is another fact which gives value.

To sum up, windbreaks can exert a great influence upon an agricultural community by protection from cold, lessening of evaporation, decrease in windfalls and breakage, assisting in pollinization by checking the force of the winds, preventing the blowing away of the finer particles of soil, and by harboring atmospheric moisture.

In my belief the whole climatic condition of a region can be made more moderate and regular by the use of windbreaks, and in the two greater valleys of California, where the north winds are so severe, that a complete change can be brought about by the systematic use of windbreaks. The time will come when these two great valleys will be divided into small farms, and each small farm and orchard will be protected by rows of tall trees running east and west, and when that time arrives the problem of the characteristic California north wind will be solved, the frosts will not be so severe, and the moisture and soil conditions will be bettered. [Applause.]

PRESIDENT JEFFREY. I am going to ask a question for Mr. Griffith to answer. Will the well-known advantages of windbreaks offset the liability of frosts that the windbreaks bring to the orchards in the narrow valleys?

MR. GRIFFITH. There is no frost on my ranch. I have had no personal experience to answer that question; but my observation in my valley where there were some time windbreaks planted, and now taken away, is that windbreaks are not of any benefit. In fact, I do know a place where the oranges were said to have been frosted right under a windbreak.

PRESIDENT JEFFREY. Mr. Leroy, are they taking the windbreaks out in this section of the country or planting more?

MR. LEROY. They are taking them out in some cases, but we have very seldom had any windbreaks in this immediate section. We have comparatively few winds. In the Cucamonga section they think they are a good thing. Pretty nearly every ten acres up there is surrounded by windbreaks. I think, as far as frost is concerned, that for a few rows

where the shade trees affect the orange trees they are a benefit, but in many cases they back up the cold if they are on the south side, and in that way a number of the trees are damaged. I think there are some people in the hall who have had experience in that direction. I know the Richards ranch—they have probably the largest windbreaks we have around this neighborhood; I don't think they were put there for windbreaks, either—but the people living north of there complain a great deal about the Richards ranch trees backing up the cold and frosting their oranges.

MR. COIT. May I be permitted to say a word, Mr. Chairman? It seems to me that this windbreak problem turns on the point as to whether we want a windbreak. The windbreaks usually have the effect of backing up the frost. If we plant trees thinner and leave them a little more open, we will at the same time allow enough circulation of air to pass through to prevent a frost pocket being formed.

PRESIDENT JEFFREY. After they all get to using these heaters like we saw up here, would not a bordering row of trees around your orchard make it easier to protect the orchard by heating than if the windbreak was not there? Will that offset the frost disadvantages, Professor?

MR. COIT. It seems to me it would, but some of these things would have to be tried.

MR. LAIDLAW. It seems to me it is a waste of time to talk about raising windbreaks in this valley. The big northers of winter seldom reach us. When they do it is only an average of one in four or five years. A windbreak renders about four rows of trees, probably, useless and it will only protect at the best about fifteen rows; so the experience of the orange grower in this valley is that it does not work.

PRESIDENT JEFFREY. The interest of the windbreaks to this convention lies in this. By the discrediting of windbreaks can we help to prevent the decadent conditions of our orchards? You have seen trees burned on the north side by the wind, and it has made some physiological derangement of that tree by burning the north side of the tender shoots. What interests us to-night is not to settle the broad problem of windbreaks, but see if we can use some one in determining their ultimate effects. When your committee goes before the University of California or the Pomona College with the proposition to give us a dozen men for three or five years, they must know what to tell them. When your committee comes before the committee of the senate and house of representatives you will want to get them interested in it. That is the reason I asked you if a botanist could help. Who will answer some more of these problems?

MR. BODENHAMER. I don't think this question of windbreaks can be settled in a general proposition. For twenty-eight years, in the first place, in Pomona and east of here, when this plain was all a desert, the wind conditions were very different from what they are now. There at Upland and Ontario we had the Santa Ana wind that blew through the Cajon Pass. When they attained greater force they would spread out through Chino. That was the only harmful wind we had until 1888, then we had a wind that came directly from the mountains. It blew down all the boom hotels in southern California. Discussing those things at that time, the inference was that when this valley was

covered with trees and vegetation the surface of the earth was kept cooler and these winds would not rush in to fill the vacuum. For many years at Ontario and Upland we have had no harmful wind. Many windbreaks were planted, but they are all being taken out now. We have had ample opportunity to observe the frost conditions produced by these windbreaks. A great many cypress hedges were built. I have seen a lemon tree near one of those windbreaks killed. Last winter, the coldest winter we had, on Eighth street there were some windbreaks opposite Mr. Dawson's and Mr. Black's. North of those windbreaks was frost; some of the trees were frosted, half the top frosted away. Just east of these windbreaks there was another lemon grove, a mature grove, in fresh, vigorous condition, and you could not see any frost on them. A young lemon grove was diagonally across the street from the end of this windbreak, and except a few trees that were up near the end, there was no frost on the young lemon trees. We have had an opportunity to observe that the windbreaks do still the air and create that frost condition, and they have all been taken out.

MR. BARNHART. The orange grove that I referred to was completely surrounded with a most luxuriant growth of olive trees, 50 feet high, and two years ago they lost every orange in that orchard. In addition to that olive windbreak they burned twenty-five tons of hay and fifteen cords of oak wood on one night to save that crop of oranges.

PRESIDENT JEFFREY. Mr. O'Gara should have been here tonight. He has been employed by the Rogue River Fruit Growers' Association to study these questions. They give him $5,000 a year, and he is employed there now; he got so busy that he could not come, but he is driving the frost back with cordwood. You can not do that in southern California, but there is plenty of wood there and Mr. O'Gara has been very successful in driving the frost line farther up the hills, just as you burn your coal baskets and your oil buckets. Now we should nominate our committees.

The following named gentlemen were nominated as members of the Committee on Resolutions, and the secretary was instructed to cast the ballot of the convention for them; Nathan W. Blanchard, of Santa Paula; A. F. Call, of Corona; Fred J. Smith, of Pomona; Mr. Stone, of Pasadena; Dr. Osmun, of Whittier; Dr. Hardeman, of Tulare county; B. B. Wright, of Riverside, and Roy K. Bishop, of Orange county.

On motion of Mr. Dreher, duly seconded, it was directed that all resolutions offered be presented to the Committee on Resolutions.

PRESIDENT JEFFREY. We will now hear a paper by Mr. Maskew—"Investigation, Demonstration, Practical Application."

MR. MASKEW. *Ladies and Gentlemen:* The following remarks are simply expressions of individual opinion upon the subject in general.

THE RELATIONSHIP BETWEEN SCIENTIFIC INVESTIGATION, DEMONSTRATION AND APPLICATION.

By Frederick Maskew, Assistant Superintendent, State Insectary.

The scientific investigation of agricultural and horticultural problems is invariably brought about by popular and insistent demand on the part of those producers who find their net profits being annually reduced by causes apparently beyond their individual control. Their attention to the necessity for a thorough, complete, and final determination of the causative agency of the difficulty with which they are contending, has been concentrated by the several theories advanced as a result of cursory—or perhaps a better expression would be—outside examinations of the problem involved. This is often further intensified by the great variance in diagnosis and suggested methods of control, which tend to aggravate rather than relieve the situation. These first aids to the wounded have served their purpose in that they have shown to those interested the urgent need of promptly obtaining the skilled services of a specialist. Nor is it considered sufficient that the specialist shall be ultimately able to prove the true source by tracing the difficulty to its origin, and showing in sequence each delicate relation between cause and effect. He is, in addition, expected to devise and bequeath a practical method of permanent control.

If the general anticipations and fervent hopes of success entertained at the outset of the investigation are to be realized in their fullest measure, unlimited time must be freely given to the investigator. No one thing detracts from complete and perfect success more than expressions of impatience regarding the progress of the work. Positive proof must come to the investigator first. He alone should be the judge of when the study of any or all factors in the case have reached a point justifying conclusions. Hearty coöperation and encouragement on the part of every one in the community, no matter whether his property is afflicted or not, should be freely extended to the work. This phase of the problem is, however, assured in advance, for the generosity of California fruit growers in placing their property at the service of research workers is already a matter of horticultural history.

Still another factor in research work, one that has perhaps proven itself worthy of continuance—especially so where mechanical means of relief are sought—is the association throughout the entire investigation of an eminently practical man with the scientist. Such an associate should be one well versed in all the orchard and field practices and customs peculiar to the locality. While the purely scientific joy that follows the solution of the problem in hand may satisfy one, the economies of continued, practical application on a commercial scale of the results obtained are what interests the other. Experimental work is invariably subject to great modifications of cost and methods. The perfection and introduction of these at an early stage conduces to the prompt adoption in general of the means of control offered. This constitutes the real value to the community of the investigation. The work-a-day world is prone to look upon the scientist as a Dreamer, but when you succeed in getting a Dreamer and a Doer working together in perfect sympathy upon any problem the results desired are sure to come thick and fast.

During the scientific investigation of most horticultural problems certain phases of the work may have reached a definite and satisfactory solution long before the investigator is ready to sum up the report of his labors. These findings may be offered to the community interested as a report of progress, in the form of a demonstration given under the supervision of the investigator in person. Such a demonstration is of incalculable value for many reasons. It maintains and augments popular interest in the work; it furnishes an ocular proof of the correctness of the findings, and is more convincing and permanent than any amount of facts set forth in cold type; its success may enable the growers to commence controlling some of the sources of loss at once. The investigator being present is able to correct any miscarriage of his instructions that might occur in manipulation, for later on he may not be available for this purpose, due to the possibility of his promotion or transference to other spheres of activity, or even if this is not the case, he invariably leaves the field of action on the completion of his work, and usually a long period elapses before the report of the work is printed or becomes available. And, further, the scientific investigator in recording the final history of the research work in which he has been engaged usually selects his diction in consonance with the dignity of the undertaking and the respect due to his brother scientists throughout the world. This is as it should be. Unfortunately this is often above the heads of the men upon whom we are eventually compelled to depend for the performance of the actual work outlined.

The general plans the campaign, but each individual battle is won by the ability of the privates to hit the mark aimed at. So in the final analysis, the commercial success of the results of these scientific investigations hinges entirely upon the ability of the workmen to understand and apply in all its details the prescribed formula.

This is where the value of the practical man will first be apparent. His acute perception of the principles of application in general are what raised him from the ranks in the first place. Having prepared himself for the occasion, the demonstration will be his opportunity and your gain. Equipped by long experience, with a full knowledge of how to do things, he now has the added knowledge of why they are done. The gradual development of the work in hand has been a revelation to him. The orderly sequence in which each factor in the problem has been tried out has enabled him to absorb and assimilate the principles involved, so that at the demonstration he is able to act as interpreter as it were and by his knowledge of economic ways and means, and also by his ability to deal with both the subject and the workmen in easy, familiar, colloquial terms, successfully translate pure science into a commercial commodity.

Once it has been proven that the true source of the difficulty has been discovered and an adequate means of control prescribed, either by demonstration or by published report, the application of one and relief from the other then resolves itself into the results of our own actions. Complete consummation of long-cherished desires should not be allowed to perish through inaction. This is no time for indifference, apathy, or half measures. On the contrary, the fact that a full measure of what was asked for has been received, calls for prompt action, unity of purpose, consolidation of effort and combination of community interests.

in applying the accepted means toward a desired end. The awakened attention of the public, in general, always incites the activities of the charlatans, empirics, and quacks, whose prime interest in the matter is chiefly the disposal of their wares and the accretion of their own wealth, and to the end that the false may be eliminated and the true method promoted, calls for both example and precept on the part of all those who really desire larger crops of better fruit for less cost of production. [Applause.]

PRESIDENT JEFFREY. Mr. Maskew's paper is really a plea for action of the fruit growers in trying to get investigation, scientific research, which will unfold and uncover some of the mysteries which seem to be surrounding the citrus business to-day.

A MEMBER. I would like to have you give us some idea as to where these several letters came from that indicated such a decadence of orange prosperity. We don't find it in this convention.

PRESIDENT JEFFREY. We brought down perhaps 75 letters, every one of which approves of the necessity of an investigation of some of these points. Most of them state that the conditions of the orchards are such as to justify it—not every orchard, but the orchards of large areas. Those letters will be on the secretary's desk to-morrow, perhaps 75 of them, selected out of a correspondence of about 150 letters, selected because they all approve of this meeting and most of them stating that it is necessary to have this investigation.

MR. DREHER. I would like to know whether you want more proof than the fact that was stated before, that the orange groves of Riverside produced only 105 boxes to the acre. Some of those groves produce 10 boxes to the tree over there.

MR. SMITH. In furtherance of what Mr. Dreher says, my recollection of the testimony presented before the Interstate Commerce Commission was to the effect that throughout the whole State the average was 115 boxes to the acre. Taking the assessor's figures, and the railroad figures, it amounted to 115 boxes to the acre for the whole State, orchards in bearing only.

DR. OSMUN. If that be true, that an acre, planted 108 trees to the acre, produces 115 boxes, then this convention has been called in good time, because I know lots of orchards that give six or seven packed boxes to the tree, and if the average is only a little over a box to the tree there must be some underlying cause that brings this thing about. It must be either lack of fertilization or overfertilization. A gentleman just made the remark that off his 30 acres his first crop was $6,000 and it degenerated to less than $100 an acre. What was the reason? Was it because he did not fertilize enough or overfertilized; that he did not irrigate enough or overirrigated; that he did not cultivate enough or overcultivated; or all the other questions of cultural methods that we are familiar with and that we use day after day? I think if what Mr. Smith has stated here that was stated before the Interstate Commerce Commission is true, then your question is answered by what Mr. Smith says, that there is a decadence in the orange groves of southern California, and it is high time that we knew what caused it.

MR. DREHER. Mr. Chairman, if you want further proof, take into consideration that there are 125,000 acres of citrus groves in this State and you only ship 30,000 cars of fruit—one car to each four acres.

PRESIDENT JEFFREY. Mr. Schultz's report shows that in Tulare county last year there have been planted square miles of trees; there have been expansions made in Riverside and all over the valleys between here and Los Angeles, until there are tens and hundreds of thousands of trees now bearing, and in the extraordinary year coming the railroads predict only 50,000 car loads. There has been but one year in the history of the industry when you have reached 40,000 cars. If some orchards are going into decadence that have been cared for with all the zeal and intelligence that can be applied by the owner, it is going to be a cumulative proportion and other orchards are going to fall by the wayside, and it is doubtful if we make any increase. If the demand of North America increases, we must keep up with that demand and try and help men who have got their all invested. I think, with Mr. Dreher, that this meeting is justified.

MR. LEROY. I think also that it is high time some such question as this was put before the people. Ever since I have been in California the method has been to have all of our papers publish about some big grove that has produced $10,000 to 10 acres, and we hear nothing whatever about the average grove or the people who are not paying interest on the money invested. There is one grove here that I believe those figures as given to the Interstate Commerce Commission are the correct ones. We have a grove in this section that produced last year 20 boxes on the average to the tree. That will be heralded all over this section, but the hundred other groves that produced not enough to pay the interest on the money are never heard of. It is time we took a little bit of the real estate boomer's literature out of the question and gave a little bit on the other side.

MR. MOORE. In connection with this subject I think it would be very interesting to know something about the cost of raising a box of oranges. I heard a short discussion between two orange growers this noon and one of them said that on his little 11-acre piece his expenses were $2 a tree. The other one, who has a hundred acres, about, looked at him in surprise and said, "You are the first grower that I have met that has been honest enough to come out and say what the place actually cost him. My expenses have been exactly $2 a tree for some time." Now, if we are paying out $2 per tree expenses and getting back a box of packed fruit, what are we up against?

MR. BARNHART. If this convention serves no other purpose it is worth while, because I discover that it is going to clear the atmosphere of misrepresentation that has gone out from this United States of America about the wonderfully fabulous returns on citrus fruit. I do know of one grower who four years ago gained $700 an acre profit on his oranges; the second year the same; the third year I think his net profits to the acre were $350, and this year, gentlemen, I don't think he will get a hundred. That gentleman, of course, did not hesitate to tell his friends about the fabulous profits that he secured from his little grove, and the result has been that a lot of individuals with more enthusiasm than wisdom, and more zeal than knowledge, have rushed into citrus fruit growing in that section of the country, and I am afraid sure disaster will be the result.

PRESIDENT JEFFREY. The deciduous growers are up against the same thing, and at the last convention, which was held at Watson-

ville, they passed a resolution advising growers to stop planting Tokay grapes, but to plant Bartlett pears and plums and almonds. The real estate men jumped all over the people who attended that convention for making that kind of an honest, plain statement. That resolution was made by a body of fruit growers, and they did not care for the real estate men. They advised everybody to quit planting Tokay grapes especially, because there was such a flood of poor Tokay grapes offered to the market that for two years there had been no average profit in the business. If they have got the courage to say those things up there, it seems to me folly to do anything else but tell the plain facts down here. It will help you, because every man that goes into the orange business is a competitor. As a marketing proposition it is not wise to encourage competitors unnecessarily or by telling high-colored stories that induce them to go in. I think we will come to the conclusion that it is time to stop playing to the real estate men and play to the men who fix your tariff and the freight rates and the Interstate Commerce Commission. It will make your land values more stable and secure.

MR. BODENHAMER. I am a better farmer than I am a parliamentarian; I am out of order, but this leaves me hungry for information. We do know there are many groves that pay from three to six and eight hundred dollars an acre. We do know there are many groves that pay nothing and never can—thousands of acres. How are you going to make a practical investigation of these conditions. The chairman has cited a grove of ten acres that is dying back. Can we have as an outgrowth of this convention an agency to make a scientific investigation to ascertain whether there is alkali there?

PRESIDENT JEFFREY. We are going to try to solve that tomorrow.

MR. FULLER. I am a little confused about that total acreage of oranges. It is stated here that it is 125,000 acres. What does that mean? Is it bearing orchards or the total setting of young trees and old trees?

PRESIDENT JEFFREY. Bearing orchards.

MR. FULLER. What do you mean; four years old and older?

PRESIDENT JEFFREY. Yes, sir.

MR. FULLER. We know that a four-year-old tree does not bear very much. It isn't fair to call a four-year-old tree a bearing tree.

PRESIDENT JEFFREY. The law calls the tree a bearing tree at four years.

MR. FULLER. But you and I know that that is not a bearing tree. We might as well try to state the facts correctly.

PRESIDENT JEFFREY. What are the facts?

MR. FULLER. I should not call a four-year-old tree a bearing tree, so therefore, I should not say there were 125,000 acres of bearing trees in California. If it is 100,000 trees and we should have 50,000 car loads of oranges that makes half a car load to an acre, and as we get about 400 boxes in a car it makes 200 boxes to the acre, which is considerably different from the proposition of a half a box a tree. Statisticians are good. Sometimes they are hopeful, like the real estate statisticians. Sometimes they are melancholy. But we might just as well get statistics that bear out a truthful proposition as far as the bearing of California orchards per acre.

MR. WRIGHT. I have been growing oranges for a good many years in southern California and I know orchards which have borne well and which are not now bearing well at all.

PRESIDENT JEFFREY. Do you know many such orchards?

MR. WRIGHT. I do. I do not know a single navel orchard in southern California, twenty-five years old, which is bearing anything like so much fruit as it did ten years ago.

The convention here adjourned until Wednesday, September 14, 1910, at 10 o'clock A. M.

SECOND DAY.

WEDNESDAY, September 14, 1910.

PRESIDENT JEFFREY. The convention will please come to order. There will be no preliminaries this morning. We will now begin the program by the reading of a paper by Professor A. J. Cook, of the Biological Department of Pomona College. The title of that paper is, "Overwork—Neglect—Decadence." [Applause.]

PROFESSOR COOK. Mr. President: I heard a good story the other night that I am reminded to tell. A boy was at college and he came home all dressed up, had on his patent leather boots and his trousers properly creased, and he said, "Father, aren't you going to kill the fatted calf?" "No, my boy, I won't kill you, but I'll work some of that fat off of you." I thought last night that the fat will be worked off of you who have orchards if you carry out all the suggestions made. [Laughter.]

OVERWORK, NEGLECT AND DECADENCE IN OUR CITRUS ORCHARDS.

By PROF. A. J. COOK, Pomona College, Claremont, Cal.

Mr. President, Ladies and Gentlemen—Friends All: Where in all Nature do we see such excessive and persistent work as we annually witness in our citrus orchards? No rest period, and great crops, year after year, with almost no let up. The rose fancier dries off his ever-blooming favorites, that rest may bring more and finer flowers. Our deciduous orchards have their winter lay-off, and in addition, their off-years, usually each alternate year they are non-bearing. But our orange and lemon groves never ask for rest-periods, never clamor for off-years. In our best apple orchards, the trees, even with their rest seasons and years, are forced by their owners to moderation. The expert apple grower never leaves his trees to their own gauge of fruitfulness, but thins, by pruning and picking the newly-set fruit, that the trees may not be overworked and lose their thrift and vigor, and that the fruit may be large and of fine quality. I once heard Dr. James Law, the distinguished veterinary surgeon, discourse on milk fever. He urged that the just fresh mother-cow be fed sparingly for two or three days. Said he, "Parturition is a serious test of strength, springing the milk adds greatly to the burden, which, of course, is exaggerated by heavy feeding, and if added to this, the cow is forced to digest a full food ration, the burden is too great and she sinks under it." Here the heavy feed was the "last straw." May we not apply the same philosophy to our citrus orchards, and may there not be many "last straws" to press with crushing weight, in some of our cherished groves? Some of you will remember that admirable address by our Nestor in orange culture, Mr. C. C. Chapman, at the Seaside Institute at Long Beach, in 1904. You remember with what urgency

he insisted that every last detail of care and management should be most scrupulously observed. Did he not have in mind the magnificent performance of our citrus groves, and was he not pleading for the elimination of these last straws? The athlete is called to his utmost endeavor, as he enters the contest, and he knows that success only comes when he forces himself to observe to the utmost every rule of dietetics and hygiene. Our citrus trees are always heavily weighted with work. Shall we not stand between them and every extra burden? It is the overload that forces the stream to fling down its burden. Are we wise if we do not make every effort to prevent the overload in our citrus groves?

I do not believe that our best orange and lemon orchards are suffering decadence. Their owners are alive to every minutest detail of care and management, and the overload—the "last straw"—is pushed aside. As the highly bred Jersey, and the sensitive thorough-bred horse, must have and deserve extra care, so our wonderful citrus trees must have the best and most vigilant care of brainy men. With this, our citrus groves will increase in beauty, vigor, and productivity.

If there is decadence in some of our groves, and surely there is, I am sure that neglect is its parent. Are these great workers always well and wisely fed? Do any of us yet know just what and when to feed? Is the life-giving water always present in right quantity? Are the leaves and fruit ever stained with smut, symbol that the blighting insects are adding many and weighty straws? Professor Stubenrauch says there are seven packing houses in all southern California where the fruit does not need to be washed. Is there lack of coöperation that all may work together to stand off the frost-evil that threatens to crush our pets of the orchard?

In closing, I wish to emphasize one neglect that I believe is sometimes present in some of our well managed groves. I refer to faulty cultivation. I know of one large orchard in southern California that I have visited several times this summer, and always with increasing pleasure, that is a marvel of thrift, vigor, beauty, and productiveness. It is also a marvel of generous and deep, thorough cultivation, and that always close up to the trees. It should also be said that in this orchard are all kinds of soil from light sand to heavy clay, and with the great depth, so characteristic of our soils, even to less than three feet from bedrock. But everywhere the cultivation is well nigh perfect, and it is rare to find a single tree that shows any sign of decadence. Is it not imperatively necessary to the best thrift and vigor of our trees, and to their productivity as well, that our orchards show a deep, fine earth mulch all the season through? This is more to aerate the soil and to promote bacterial activity than to conserve moisture, important as that is. In clay soils, especially, where the land is low and flat, and more especially if there is any lack of perfect drainage, because of a heavy clay subsoil where the soil-particles are so likely to become cemented together, this thorough tillage close to the trees is all the more called for. This thorough tillage of our clay soils close to the trees is as important as is humus to the well-being of our orchards that are of a sandy constituency. Is not the reason why our groves on gravelly or even stony ground are often so surprisingly productive and satisfactory because they are so well aerated and so well drained? Are not some of

the blights, possibly, like "wither tip," gummosis, and "sclerotinia" induced or at least encouraged by this lack of proper cultivation? I feel sure of it. Show me an orchard that never knew smut, is well fed, is rich in humus, and properly irrigated, and, most important, thoroughly drained and aerated by always carrying a deep, fine, dry earth mulch, never less than four inches, better six, and you will show me a grove that very rarely will show any presence of blight or any evidence of decadence. This will require the heading of the trees high enough to cultivate thoroughly close to the trunks. I believe that Mr. Chapman is wise and sane in trimming his trees up from the ground so that the cultivation may reach very near the trees. Suppose that it does take a little of the bearing wood; goodness knows that the trees will do enough, and we make a serious mistake when we leave the earth hard and baked for a wide space about the trunk of the tree. The trees, by their colossal effort to swell the pocketbooks of their owners, have earned a right to all the soil and should not be forced to subsist simply on the limited area between the often too closely set trees. I am so sure that this ought not to be neglected, especially on low, flat clay soils, that I can not refrain from speaking with great earnestness, as I plead for better cultivation of the entire orchard, not omitting the space close about the trees. [Applause.]

MR. CALL. I feel that there are some questions presented by Professor Cook's paper that deserve more than passing notice. For one, I feel that citrus fruit growers should never be afraid of the truth in regard to the situation. I know that a great many have orchards for sale. I know that a great many have pride in the State and the county and the locality. I know a great many men are inclined to close their eyes to the truth, but it seems to me that our industry is so vital to us all that we should not be afraid to face the actual condition that exists.

PRESIDENT JEFFREY. Mr. Call, I understand that the committee on resolutions will present a resolution that will give you the opportunity of making this little talk where it will do the most good. Will that satisfy you?

MR. CALL. That satisfies me. There is another point in the Professor's remarks, and that is in regard to cultivation. In our colony we have abandoned deep cultivation and we think it proper. That was the theory a few years ago, but we have all abandoned it. We feel that deep cultivation injures the trees.

A MEMBER. What sort of soil have you?

MR. CALL. We have all kinds of soil in there, granite soil.

A MEMBER. How deep do you cultivate?

MR. CALL. We aim to cultivate about five inches.

MR. BLANCHARD. In regard to deep cultivation, my experience may be very beneficial. My oranges used to have famous keeping qualities. For years they have not kept well. It has puzzled me beyond anything, and I did not know what to lay it to. My foreman has been in the habit of putting the cultivator deep down, I think 10 or 11 inches, early in the spring. This last year I had another foreman and I told him not to cultivate deep and I had the best keeping oranges this year that I have had for years.

Now, in regard to fertilization. I made an experiment of this kind; I followed it up for three years. I put 15 pounds twice a year on a

certain number of trees. I put 10 pounds twice a year on a certain number. I put 20 pounds twice a year. I thought in three years' time I could determine. I found that ten pounds was not enough. I found that 20 pounds gave me a magnificent tree; it did not give me so much fruit, neither was the fruit so good, as where I put 15 pounds a tree.

MR. TEAGUE. I feel that there is a chance that we may perhaps get wrong on some of these things. May it not be that Mr. Blanchard may be wrong in attributing the good keeping quality of his fruit this last year to a change in cultivation? We all know that for several years prior to this last year the keeping quality of fruit in California was not as good on everybody's grove as it was this last year. I have a grove that has been uniformly—I think I am safe in saying—the deepest cultivated grove in California, 40 acres, and I think to-day it is in as good condition as any in California. I cultivate seven or eight inches deep, and sometimes deeper. This last year the keeping quality of the fruit was superb. The year before it was not so good. I did not change my method of cultivation at all. It seems to me it is not safe to say that the better keeping quality of Mr. Blanchard's fruit is entirely due to the change in cultivation. I have a grove situated only two miles from Mr. Blanchard's, in the same character of soil, and it seems to me there is a chance we may be wrong. I would not allow it to go out as an absolute fact that the good keeping quality of Mr. Blanchard's fruit is due to his change of cultivation. Those are things we have got to demonstrate, it seems to me. I know on our heavier soil we have to cultivate deeper. I have never been able to get a mulch that will hold moisture without pretty deep cultivation.

A MEMBER. Do you cultivate during the winter?

MR. TEAGUE. During the winter I grow a cover crop. The trees are eighteen years old. The soil is a clay loam of quite heavy nature. I will put my orchard up against anybody's for thrift.

A MMEMBER. Do you cultivate close to the tree?

MR. TEAGUE. No; the trees are lemon and naturally the lemon is a drooping variety. We have not trimmed up as much perhaps as I think we will in the future. I am inclined to think Professor Cook's idea is well taken, but I would not want to cultivate right up to the tree deep. I would not want to cultivate right up to the tree where the roots are near the surface.

MR. DEWEY. I have seen, perhaps, hundreds of orchards, and all of the orchards I have worked in where there is deep cultivation, we have our best trees, our best fruit and the most of it.

MR. JOHNSON. I came here to hear something about the die-back in orange trees. I came here twenty-seven years ago and twenty-six years ago this spring I set out orange trees. They have had the very best of care, but they are dying now. They have had lots of fertilization, lots of irrigation, lots of fumigation, and lots of elbow grease. They are right on San Bernardino avenue; any one can go and see them.

PRESIDENT JEFFREY. I will say that there are several people here who do not believe Mr. Johnson's story. They don't believe there is any decadence.

MR. JOHNSON. Well, they don't bear. The young trees have a big crop, just as full as they can hang, like blackberries.

MR. FREEMAN. I want to ask a question of Professor Cook. He attempts to make provision for an increased growth of the tree and an increased crop and yet he tells us there is an overbearing. I would like to ask how he would prevent the overload?

PROFESSOR COOK. I did not say that I would prevent it. I said we were going to have the overload, and for that reason we ought to observe every detail of care and management. It makes it necessary, I think, to cultivate deeply and pretty close to the trees.

MR. SMITH. I want to vouch for Mr. Teague's statement. I travel from one end of this State to the other, and I want to tell you that the 40 acres Mr. Teague has told you about is the best cultivated 40 acres in the State of California. It is the cream of every citrus grove in this State and it is the best producer, and I account for that production from the deep cultivation that he has had there for the last eight years. It is an ideal 40 acres, and the shallow cultivation in other places has caused lots of this going back.

MR. CROWELL. I feel that if we don't go any farther on this we fall short of the point. I agree with every word Professor Cook says, but I think he has stopped short of the point. He has been discussing good trees, trees that did not come from the sucker. Those are the trees that are not deteriorating. What we want to know is in regard to the trees that will deteriorate. I have a grove only three miles distant where I have both kinds of trees. They are about twenty years old. The orchard has had good care and all of the trees have had the same care; some of those trees are in fine condition and bearing well, and some of them are deteriorating and they are not bearing. If you spend the time discussing whether the Washington navel goes back to the Australian or whether the Australian goes up to the navel, part of you will go away believing one story and part another, and you will fall entirely short of solving the problem of deterioration if you do not discuss pruning. You do not need a physician for one who is not sick. The professor has been discussing trees that are not sick. I can take you out and show you trees that are sick. I was in Redlands last week and saw the orchard of a man who has been in the orange business nineteen years, and yet I saw great big suckers as large as my arm growing up from the crotch of those trees, forming a great umbrella on the top, and that sucker was of a nature which would not bear good fruit and it was of short life, and they had deteriorated and of course they had robbed the rest of the tree. I say that we ought to discuss the question of pruning. I at one time did not believe in pruning the orange tree at all, but I now believe in pruning it from the time you set it out from the nursery. The suckers will rob the rest of the tree; they are rank growers, and the real tree will be left in the lurch. I think if you will visit the Government orchard at Crafton you will see the remedy for this deterioration.

Now, one word in regard to fertilization. Two years ago I fertilized in the summer time. My grove improved from fertilization on the roots, of about half the grove. The other half I did not fertilize, and using that fertilizer in the summer wilted my grove. The half that I did not put fertilizer on did not wilt. I use more fertilizer than my neighbors and I do not argue against using fertilizer, but use it intelligently. We have a great deal of wilt in our colony.

MR. VAN LUVEN. There is just one question in connection with Mr. Johnson's grove. He doesn't make it clear how long his grove has refused to bear fruit.

MR. JOHNSON. They quit bearing three years ago.

MR. KUSTEL. Eleven years ago I bought an orchard that was not of much account. The trees were seven years old and it took eleven years to make a first-class orchard where every tree looked like its neighbor. The orchard is up here at Ontario; it is one of the best ones in the colony. That was done by paying attention to pruning, deep cultivation, plenty of fertilization and good irrigation.

MR. MACOUN. I just want to indorse every word of Professor Cook's paper. It is the keynote of success. The farming of to-day has brought around decadence in our orchards. It has brought about decadence in every part of the world where farming has been done and not in the proper manner. Cultivation had nothing to do with the fruit in the orchards that Mr. Blanchard spoke of.

PRESIDENT JEFFREY. Mr. Macoun, as you all know, has an opportunity of speaking this afternoon, and there is no one in the State that is more able to speak practically on these matters than Mr. Macoun. He speaks instead of Mr. Mills, and it is a pretty difficult proposition to take Mr. Mills' place.

MR. MUSSEY. I want to suggest a question in regard to aerating heavy soil. On heavy soil will the farmer get a sufficient drainage by putting in a tile drain, say two or two and one half feet; will it pay for the cost? I don't know of a single case in California where they use tile draining.

MR. MACOUN. I think Mr. Koethen has used tile draining. We have used them this year but the time has not elapsed that we can see any great difference in the rows of those trees.

PRESIDENT JEFFREY. The next paper will be by Professor Chase, of Fair Oaks, in the northern citrus belt, and his paper is entitled "Investigation of Citrus Subsoils." [Applause.]

MR. CHASE. *Mr. President and Ladies and Gentlemen:* At the wedding of Jupiter and Juno, the gods and goddesses vied with each other in bringing presents to the bride. Among them was Pomona, who brought a branch loaded with golden apples. These so delighted Juno that she ordered Pomona to plant them in her gardens. She instructed the Hesperides to take care of these apples and permit no one to take them, but these sisters grew careless and often were found eating the fruit themselves. To protect this fruit from being taken by gods and men, a terrible monster was placed at the gates of the garden. The fame of this fruit and the difficulty of securing it were world-wide. Eurysthenes sent Hercules to secure some of it. After a long and difficult journey he came to Atlas, who was the father of the Hesperides. He was at his post supporting the heavens on his head. Atlas agreed to help Hercules get the fruit. He was willing even to go himself if Hercules would take his place during his absence. After a few days Atlas returned with three golden apples. He decided that he would deliver them to Eurysthenes himself. Hercules feigned assent, but desired Atlas to do him a favor by holding the heavens till he could make a pad for his own head. Atlas, willing to accommodate him, placed the apples on the ground and took the place of Hercules; but Hercules, as soon as

he was released from his task, gathered up the apples and departed, leaving Atlas to continue his work.

The hundred-headed monster still stands at the entrance of the garden keeping the citrus growers of this State from realizing the full fruition of citrus culture. Now, we have come down here to Pomona to see if we can not get around that hundred-headed monster that stands between us and these trees. We have brought our Hercules with us, and we expect, and I have reason to expect, we are going to knock off some of the heads of that hydra-headed monster that stands between us and success. If you, as Atlas, lay aside your labors and help us get them and bring us the golden fruit, our Hercules will divide with you all and we will all share together. And he will do more. When we go home I think he will pull up those mountains that separate you from us, by their roots, and hurl them into the deep sea, and henceforth there will be, horticulturally, no north of the Tehachapi and south of the Tehachapi, but there will be emblazoned upon our banner, "California, the Golden State, for Golden Fruit, One and Indivisible!" [Applause.]

Now, I come from northern California and the conditions I talk about will be suited to that locality.

INVESTIGATION OF CITRUS SUBSOILS.

By Prof. Elmore Chase, Fair Oaks.

The orange tree in our land and in our climate is an exotic. May there not be some suggestion towards a solution of some of the problems that confront us by noting the conditions where the tree is indigenous and where it is exotic? We know that the soil of its home was very rich and very deep and that the trees grew to be centuries old, and from the meager knowledge we have, that the period of productiveness was continued with the age of the trees. W. D. Howells, in his "Indian Summer," describes the garden in Venice as having orange trees hundreds of years of age laden with fruit.

There is no doubt we have more orange climate than orange soil in this State. Our inquiry along this line of thought will be confined to subsoil conditions, treating of the root system physiologically and of the inert subsoil, that is, soil that contains or is capable of containing plant food which is unavailable. This will not include hardpan and such impervious material.

ROOT SYSTEM.

The root system of the orange tree is notably a great feed getter. It is capable of adapting itself to the work of taking from the soil all the food a vigorous and rapidly growing tree may demand, both for wood and for fruit. No root system works more energetically or penetrates with greater persistence through resisting difficulties than does this ancient sour root when budded to a navel orange. It must have space. When the tree has been planted in a hole made by blasting through hardpan and the root system has taken the food within this cavity and encounters the solid wall, it climbs upward till it reaches the soil above and enters this soil in search of food. Sometimes, in creeping up the wall of hardpan, it penetrates a crevice and in passing through this it flattens itself out, and after reaching the soil beyond it assumes its natural shape and keeps at work gathering food. Many instances have

been noted where the roots of a tree which descend into the ground with an angle and reach the depth where there is excessive moisture, will die at the end and the living end near the tree get a diminished supply of food. Immediately at this point adventitious fibrous roots are sent out. These creep along the dead portions just beneath the bark. These roots are so numerous that the bark is forced open and a temporary supply of food is secured. Every orange grower is familiar with these masses of feeding roots that come so near the surface if the soil is not stirred. This interesting character of the root system emphasizes the importance of deep soil supply of plant food.

Where hardpan is less than two feet from the surface, however rich and fertile the soil may be above, the root system hugs close to the hardpan, reaches out a greater distance from the tree, and sends up its mass of fibrous feeding roots to the soil above. With proper care such trees will produce an abundance of fruit many years, how many is not easily determined. It may be laid down as a fact that wherever the root system is repressed by soil conditions, such as hardpan, compact gravel, and inert soils, and these conditions can not be overcome, orange growing will be a failure.

There is one feature of the root system which should not be overlooked in this discussion. It may suggest some idea which will help in the solution of this problem. It is well known that the visible roots of the tree, however small, do not directly take the food from the soil. The real organs which take up the food held in solution in the water of the soil are very minute root hairs. These are coexistent with the foliage. On deciduous trees, when the leaf has ceased its functions, the root hair also ceases. These root hairs are deciduous with the leaves. In the absence of these the root is no longer capable of taking in food. This is the case with all deciduous trees. They are dormant for a period of time and that time is when the weather conditions are not favorable to the growth of the trees. The orange tree is an evergreen and except in northern climates never ceases to grow. Its root hairs or feeding organs are always present and active. May it not be that by this activity the orange tree may suffer more by the vicissitudes of soil and climate? Is it not exposed to dangers which the deciduous tree escapes? May not this difference in the action of the two root systems, the evergreen and the deciduous, suggest methods of treatment which recognize this condition of the feeding organs of the orange tree?

SUBSOILS.

The principal function of soil is to hold plant food in store for the use of the plant. A fertile soil is a soil that has in it, or is capable of having in it, plant food to be supplied to the plant on demand, hence any soil qualified to take plant food on deposit, and hold it subject to the demand of the root system, may be considered fertile soil. It is a rich or a poor soil according to the amount of available stock it has on hand. An inert soil is a safety vault locked up and the key lost. It can not receive, deposit, or pay out what it may have in its possession, but recent investigations in soil bacteriology have demonstrated that there is but little soil which can not be made fertile.

The question of inert soils in the Sacramento Valley is a new one. It is not strange that these soils so compact, impervious to water, which

have been undisturbed for unknown ages, are considered unfertile and of no more use to the tree than so much hardpan. There are very large areas of such soil capable of becoming quite rich in plant food. This soil can become useful by some methods of cultivation and by means of fertilization. The investigation of such soils is so recent that but little knowledge has been acquired concerning them, but enough has been done to lead to some suggestions and create a new interest in soil studies. A brief reference to a few typical cases is all that can be given in this paper.

A ten-acre tract of land with a depression running diagonally through the field is a case in point. The land on both sides slopes gradually towards this depression. On one side the higher portion is underlaid with hardpan or impervious soil. The examination was begun to determine why the trees in the lowest portion were unthrifty, dwarfed, and dying. The soil was found to be of good depth and fertile for two feet. Below this was a substrata of compact soil which prevented drainage. The ends of the roots of the trees were found to be decayed, such as would be the case with excessive moisture. The examination of these roots showed the sending out of adventitious roots beneath the bark as mentioned above. There was no disease connected with any tree except some slight evidence of gummosis, which, however, is not a disease. The following remedy was prescribed: Early in the winter a surface drainage ditch was to be made through the lowest portion of the hollow for the purpose of draining the surplus winter rains. The trees were to be severely pruned back, a good coat of stable manure plowed in in the spring, and deep cultivation to follow. The summer irrigation was to be moderate, and care was to be taken that no more water was allowed on the side hills than could be retained in the soil. The result was that every tree thus treated sent forth during the past season a marvelous growth of wood. The new life given to this half acre of dying orange trees was in no way due to the action of the inert subsoil; but it is evident unless this subsoil can be brought into activity, the productive period of all of these trees is limited to a few years.

In another class of subsoils, though not wholly inert, owing to the compact nature, the fertility is very low. The trees were planted with very great care. Very large excavations were made and filled with surface soil. This grove, from fifteen to twenty years old, has been yielding moderate returns and is still in a very fair condition, but the trees show they have reached the limit of profitable orange growing. There is neither soil nor food enough.

Another type of soil quite common in this valley is seen in a ten-acre tract of a heavy clayey soil, but very rich in plant food and seems well adapted to growing the orange tree, but between this upper soil and a subsoil is a shallow layer of hardpan. This tract was planted twelve years ago and at six years of age the trees, though bearing quite heavily for their size, ceased to show signs of further improvement. After changing owners three or four times, it was bought by the present owner. His thorough cultivation began to make improvement. He found many trees failing to respond and some were dying. They had all been planted in holes blasted out by dynamite. The tap root would go down to subsoil, but the trees as a whole were slow to respond to better culture. The owner dynamited the whole tract between the rows where the hard-

pan existed and completely broke it up. By adding various fertilizers and by careful cultivation these trees, now twelve years old, are most of them considered large trees for their age, and are bearing a profitable crop of oranges and have been for the last five years.

These examples are enough to suggest a very important idea. Unless soil has the depth of two feet or more above hardpan or any unfertile subsoil, citrus culture will not pay for the outlay as well as some other fruit. Hence it is of the greatest importance to all who think of growing citrus fruit for profit to examine thoroughly the condition of the soil even before money is invested in its purchase. This is especially important in planting orange orchards. If the soil is of good depth and any hardpan or impervious soil beneath this soil is capable of being broken up, then it can be made a good investment. It is the want of capillarity in soils that renders them inert or infertile. In order to bring all soils into first class condition for the growth of plants of all kinds, we must increase the capillary attraction of the soil, make it porous, capable of receiving and delivering air and water. We have two very efficient agents for producing this result, one mechanical and the other vegetative.

Then the following directions are given to render the soil suitable for the growth of the exotic golden apple tree: First, let the land be surveyed and staked for tree planting. Make a plot of the land and then dig the holes for all the trees very wide and very deep, shooting them with dynamite wherever needed till a complete drainage is obtained. Then let the holes be filled with good soil so that the surface when settled shall be even with the adjacent ground. Give this soil, whether hardpan or compact soil, a thorough plowing with dynamite everywhere between the holes. This should be followed by a very deep plowing with no less than a strong four-horse team, and it might be well to give this a subsoil plowing with a still stronger team. The irrigation system should then be established and the whole field thoroughly prepared for alfalfa growing. Keep this in alfalfa not less than five years, when its root system will be down deep in the ground penetrating the inert soils.

Such a preparation for planting will secure at the age of ten years an orange grove giving larger returns than is generally received from a fifteen-year-old grove planted in the ordinary way. During the first five years this field, according to F. Q. Story, president of the California Fruit Growers' Exchange, will be producing the safest and most remunerative of all crops grown in California. The work of preparing the land after the period of alfalfa will put the soil in prime condition, with abundance of fertility sufficient to bring the trees to bearing. The depth of such a soil will give absolute freedom to the root system and enable the soil to hold and assimilate any amount of fertilizers that the grower may deposit. The trees may be given such a bank account of stock that we may have good reason to expect a period of undiminished fruitfulness for more than one generation. All our planted orange groves may have this infertile soil brought to activity by degrees, by deeper cultivation not too close to the tree, and by using dynamite freely, and growing during the winter season cover crops which have long roots. Stable manure fertilization, along with the deep rooted cover crop, will make rapid progress towards quickening to life

activity the compact inert soils in our existing orchards. The best means, however, is the cover crop. The more this is used the more efficient it becomes. The large increase of productions per acre in Europe after centuries of cropping the soil, is an object lesson in promoting the development of the inert subsoils. [Applause.]

MR. LAIDLAW. I think this is one of the most important papers we have had before this convention. After growing oranges for fifteen to twenty years, my observation is that the old orchards are going back—orchards that have been planted on shallow soil. The reason for their going back can be explained in various ways—if a man falls down on his irrigation or cultivation or fumigation. I believe that one thing has not been mentioned so far in this conference that has more to do with the deterioration of our groves than anything else, and that is the use of distillate spraying seven or eight years ago. They were sent on the downward path by distillate spraying.

MR. FREEMAN. I would like to ask this: When can we have that paper on frost?

PRESIDENT JEFFREY. We are not going to have it at all. Professor O'Gara promised me that he would have that paper for us, and he was so anxious to do it. But the day before I left he wrote me that he had now gone into the service of the Association of Fruit Growers of the Rogue River Valley.

MR. BODENHAMER. Could you not secure that paper from this gentleman and have it published in your report?

PRESIDENT JEFFREY. I believe I can.

MR. BARNHART. I move that a rising vote of thanks be tendered Mr. Chase for that very excellent paper. I think the convention will agree with me that that paper is of sufficient merit that this convention show its appreciation by a rising vote of thanks.

The convention rose, with cheers.

MR. CHASE. I thank you. I want to say just one word more. In Europe, where they have planted soils for ages and ages, they are raising larger crops every year than they raised years ago, and it is by this method of getting down.

MR. TEAGUE. There was a fact in regard to the planting of our groves that came to our attention recently which I would like to call attention to that may throw light on the condition of some of your groves in regard to decadence. We had some spots in our grove that were not looking right, and we were at a loss for some time to determine the difficulty; they were surrounded by as thrifty, vigorous trees as you ever saw. The soil is excellent, no hardpan, of good depth, 50 feet deep, perhaps, so there is no bad soil condition whatever. We finally determined to make a survey of the ground to determine the grade. We irrigate by the furrow system of irrigation. That survey developed this fact, that every spot that we had in the grove where the trees were looking yellow and were ceasing to bear, the grade in the direction in which we irrigated was too flat, that it would run below a fall of six inches in a hundred feet; and in every case where the grove was looking in good condition it had a good grade in the direction we irrigated, in some places as great as three feet in a hundred. We feel certain that the condition of those trees in those spots is due to the fact that those trees, in order to give other parts of the same rows sufficient quantities of

water, had received too much water, and I believe here in California we pay too little attention to the grade in our citrus orchards. You may have a beautiful piece of land, but you may plant it wrong. I used to think if a furrow would stand up full of water and just gradually move through, it was an ideal condition. I believe now the more grade you can give your furrows and not wash the land, the better. Some soils you can give twice as much grade to as others. We had a little section of our grove, on this same sort of soil, where the ends of the rows flattened out, and in order to get enough water in the winter time, the storm water in the winter would settle in there, and in irrigating, in order to get the water across that place, we had to run it a long time, and we found that in that flat place nearly all the trees turned yellow, later got gum disease, and we lost thirty-five trees. We changed the system of irrigating so as to give it less water and not allow storm water to get in there at all, and those trees all recovered from gum disease and are now thrifty trees.

PRESIDENT JEFFREY. I will ask Mr. Call to come forward and speak on the subject assigned him, "The Treatment of Gum Disease." I wish to pay just one little tribute to the Pathological Station at Whittier, by remarking that in my opinion it gave the first impulse to the plan that is now going to be discussed.

TREATMENT OF GUM DISEASE.

By A. F. Call, Corona.

MR. CALL. *Mr. Chairman and Fellow Growers, Ladies and Gentlemen:* It is with a great deal of diffidence that I speak on any subject of horticulture or the care of trees, because I know that conditions are so different in the different localities, and the treatment required for different groves and different locations and at different ages is so diverse that it requires a man of very long experience and larger ability than mine to give any general advice. But this matter of gum disease is one that interested me very particularly, as I had about 1,600 trees affected four years ago, and so I gave it some study by going to Florida and into the different portions of California to make a study of it, and spent about a year in experimenting. I, perhaps, should say that I ought to have reduced this to writing and had it in the form of a paper so it would be better reading, but my time has been so occupied since Mr. Jeffrey invited me to talk on this subject that I have not been able to do it.

In my investigations of the gum disease I found at least two distinct troubles, and I want to make it clear as to which I am speaking of. I found a disease of the lemon tree and which affected some orange trees, the characteristics of which were a gathering of the sap under the bark, making blisters and pockets of sap, which, by evaporation, I suppose, was afterwards reduced to gum and broke its way through the bark and flowed down the tree, usually at a distance of about four inches to a foot above the ground. I also found that another form of the gum was the breaking out in small globules or bits of gum, from orange trees in particular, affecting the trunk and the limbs of the tree, causing a roughening of the bark and a rolling up of the bark, that is commonly called scaly bark of the orange tree.

I want to speak first of the lemon gum, as we will call it, although it does affect orange trees as well, because I am more familiar with that and the trouble is more obvious and the difficulty is more easily overcome. I found that this gum was most prevalent where the drainage was imperfect and where sediment had been permitted to pile up around the trees, such as a little depression in the orchard that had not been filled before the tree was set, so that after irrigation, in forming the grade that the water naturally forms, the earth had been piled around the trees a little too high, or where the trees had been set a little too deep. Most of the trouble came from the foot of the grove where there was a depression and somebody had let the waste water from irrigation accumulate some sediment. I tried first to demonstrate to my own satisfaction that this disease was not contagious, not bacterial, and I think I demonstrated that completely by inoculation. I took the worst gum I could find, from the rottonest trees, and opened the bark of a great many live trees, inserted the gum under the bark, tied it down, and I was unable to produce any gum in those trees. I then endeavored to produce the gum, and I found I could produce it in a very short time in a great many different ways. I found that I could produce it by putting some strong manure or fertilizer around the trunk of the tree; or I could do it by putting on an excessive amount of water; and I could very easily do it by taking a little wooden hammer and hammering a little spot on the trunk. The gum would form in two weeks. You did not need to break the bark; just hammer it so it would deteriorate. I then concluded that gum was caused by a cultural condition and that the cause of it was a deadening of the member, destroying its sap-carrying power which stopped the down-flowing sap, forming pockets of clear sap; and I will say in that condition we took gum and had it analyzed by chemists and it was pronounced simply sap and nothing else. These pockets of sap, unable to pursue their way down the tree, were compelled to remain there until the water evaporated and left this gum, and that stayed there until it rotted its way out. If that is permitted to continue, of course it will go around the tree and girdle the tree and kill it. In experimenting with the remedies, I found that these trees could be very easily cured; and I want to say here, I don't want to take credit to myself for this, wholly, because a great many of us were working together. My foreman and Mr. Jamison and Mr. Hampton and Mr. Griffin and different ones have contributed in large measure to this, so I should say *we* found this out. We found that what we needed to do was to let out that sap or gum as soon as we could, and the way we did it was by making little furrows down the tree, not too many and not running together, perhaps not nearer than an inch and a half apart, maybe two inches apart on a tree largely affected. It is important to go as high as the limbs so a gum will exude before it forms a pocket or becomes destructive to the tree. Then we found that by oiling the bark we could hasten its recovery, and we wanted to use an oil that was softening. The worst thing to use is crude oil or crude oil and carbolic acid together; that destroys the bark. What we want to use is a soft animal oil, lard or neat's-foot oil, and we all found that neat's-foot oil was the best, so we applied that liberally, two or three applications two weeks apart. And then, to protect the bark from baking we whitewashed the trunk of the tree, because we frequently were compelled to

let the sun in. The proposition is this, that you have got to have enough bark to carry the sap, and this gum pocket usually comes from a very healthy tree, carrying much sap. The injury has come from various causes, mainly from the piling of sediment around the trunk of the tree, or by water, or by redwood stakes that have been pulled up, that the tree has grown around, or by stones that have been gathered in by the roots and absorbed by the tree. There are various ways in which this can be caused, but anything that affects the tree is that portion of the bark extending from the crown roots up above the bud. That bark was intended by nature to be exposed to the sun and air, and when it is not so exposed it deteriorates. The surface of the root is hard; it is impervious to the acids of the soil, but when you take that portion of the bark that nature intended to have exposed to the sun and air that is covered with that earth, you have nothing there that will protect the bark from the acids of the soil; it immediately gets brown and deteriorates. Then you have the condition of a big top which puts forth and uses a great amount of sap, returns a great deal of sap to the soil and a narrow channel in which to return it, because it has been partially injured by the gum; you have not enough bark left to carry the sap to the ground, and so it is necessary to cut off a part of the top. For instance, if you had a half-inch pipe and you are trying to carry a big amount of water through a two-inch pipe above and you could not carry it down and it was overflowing, you would either have to enlarge your outlet or shut off your source. You can not enlarge your outlet all at once, so the only way to overcome that gum is to cut off part of your top. Right there is a fact which I don't know how to explain, and that is, if you cut your top off even all around it won't do any good, but you have got to cut your limb clear back to the trunk. Mr. Griffin has cured their entire grove by this method and he will agree with me in saying that you have got to cut your limb back to the trunk. We found that absolutely important and vital, because that stops the flow of sap down through the destroyed part of the tree and gives it a chance to heal up. In a lemon tree, cut from the big limb that is right over the gum spot. In a year or two it will heal over and you will never feel the loss. A lemon tree is different from an orange tree in this.

Right here I want to say that I am not a scientific observer and I have no scientific education, but I have found from observation that the sap-carrying cells of a lemon tree run right up and down. You find trouble with a lemon tree and you will find it right straight down, but in an orange tree you can find it any old place. That is, apparently. I say that with some diffidence because I don't know that to be a fact, but I say apparently so, because I find the difficulty in an orange tree on the opposite side from where the trouble appeared on top.

The next thing to do is to remove the cause, and the best way to remove the cause is to establish drainage. You can not cure it unless you establish drainage. The next thing to do is to clear the earth away so that you can expose the crown roots so that the air can get at them, and see that the water does not settle around your tree or the sediment does not form around your tree, and if you do that, in time you will save your trees. I demonstrated to Professor Ralph Smith that you could save a tree that had only an inch of bark left. Now, there are about four inches of bark almost going around the tree and the tree is

bearing heavily. It can be done when you have got down to a very narrow proposition, and I think I can say with perfect safety that this will absolutely cure the gum disease on lemon trees, because Mr. Jamison has done the same and Mr. Leffingwell. I have never heard of a failure where these directions were faithfully carried out. There might be a case where you could not get drainage that you could not get the results, but where you get drainage you can save your lemon trees.

A MEMBER. There is one point that I would like to have you make a little clearer; that is, the point of the cutting back of the tree. Frequently, one half the tree may be diseased and the other half look healthy and good. How do you cut that back?

MR. CALL. I cut that back to the trunk, whether it shows it or whether it does not show it. The big limbs clear back to the trunk should be removed on the side on which the gum appears.

A MEMBER. I am astonished at that, because we followed that method without good results. We found that the diseased part came back and the good part came back, all alike.

MR. CALL. None of us have had that experience, and I think it must be due to the fact that your tree was not badly affected.

A MEMBER. Some of them did not have more than two or three inches of bark.

MR. CALL. I compared that with Mr. Griffin. I had about twenty acres to cure and he had over a hundred. When he first came up to Corona to study into the matter and formulate his methods, we didn't have that point in our mind and didn't give any advice on that. We were pursuing the same method he was, pruning around all over the top, lessening the side of the top evenly, but we discovered that the other way was the best in our groves, and when I was done talking with him he said they had changed and were cutting back to the trunk. But perhaps your experience is as valuable as mine, but that is my experience and the experience in our locality.

Now, with regard to scaly bark on the orange tree I am not so clear, and I would not want to say with any great certainty as to the cause or the cure. I can only give you my experience. I had 400 of those trees in my grove, mostly among the older trees, and I investigated the roots of each one of them. I put a careful man at it and had him go down to the roots, and in every case but two I found what we thought was the cause. It was usually a stone buried in the tree or covered in by hard sediment that had formed around the tree from silt that had got hard, or by a redwood stake, or by a crossing of the roots that stopped the circulation, and in a few cases bad crossing of the limbs had caused it. We removed what we supposed to be the cause. Where we found a stone buried in the roots of the tree we hammered it out, or took up a stake, or took out cross limbs. We pursued the same remedy we did with the lemon trees; that is, we dug away, exposed the roots, oiled with neat's-foot oil, furrowed the front of the tree. Where we found a yellow color we cut it out, and I have lost four trees out of 400; the rest got well; the scaly bark entirely disappeared. So I feel that I can say that I have an opinion that it is local trouble with the tree, and that it is more frequent in a piece of sodden ground than in a piece of ground where the soil is loose. I have given this experience to several, and some have reported to me that their trees had recovered. I have had reports from but few on this branch of the trouble.

MR. BARNHART. I have an orange grove under observation, the one that has produced $700 worth of fruit net for two years, and, unless my judgment fails, that orange grove is doomed from the very disease that you speak about. It is growing in sandy soil and as soon as this convention is over I am going to see that grove immediately; but what I want to know is what kind of soil you grew your trees in.

MR. CALL. I had different kinds of soil, but the groves I had the most trouble with were in a sandy soil with stone in it, and the grove that I had next to the worst was a gravel and clay soil. I didn't have any of that trouble where it was loose and free from stone.

MR. GREER. How long after treating the trees does it take to cure them?

MR. CALL. I didn't see much improvement in the orange trees for a year. In the lemon trees I saw it in a month; I could see that it had stopped spreading, and in a year it commenced to smooth up and at the end of two years you can't find a mark on them.

MR. GREER. I have done the same thing a year ago, and while the gum is gone the trouble is still there. I have tried everything that has been recommended with no success. This is the only thing I have found success in. Each limb is practically supplied by certain roots. When you have cut off that limb you have cut off the cause. If there are obstructions in the roots the sap must break out. There is where your cross roots or rocks cause trouble.

A MEMBER. You spoke of making furrows down the trunk of the tree. Will you please tell me the width and depth of those furrows?

MR. CALL. We took a little blacksmith's paring knife, a thin bladed knife, and doubled it back on itself so as to make an acute angle in the blade and getting a furrow about an eighth of an inch wide and clear through to the wood. The gathering of the sap is between the bark and the wood. We didn't put them any nearer than an inch and a half apart; four to the tree would answer.

MR. WOOD. Do you think it would be advisable to fill up that place around the roots with anything after the dirt is taken away?

MR. CALL. We haul river sand. We let them stand open for a year and fill the place up with sand.

MR. WOOD. I did that same thing. On 600 trees I had 110 cases. I don't think there is an active case in the orchard now except two or three trees that were so far gone they died. Another source of the gum disease would be a place along the body of the tree where you might have cut out a limb. I saw a case of that kind this morning at my orchard; my man called my attention to it. I have seen that a good many times, and I would ask Mr. Call if he would not coincide with that?

MR. CALL. I think anything that would stop the flow of sap would cause it.

A MEMBER. My soil has no rocks. It is a heavy soil, has good drainage; the drainage is almost perfect. I would think from your talk it must be hard ground around part of the tree, perhaps, that would cause the gum disease. It is sufficient to take the soil just around the tree.

MR. CALL. Expose the crown root for a year. Put in something to take the place of the hard clay around the roots.

A MEMBER. How about the temperature of the oil at the time you apply it.

MR. CALL. We use it normal.

A MEMBER. How soon do you put the oil on?

MR. CALL. I do it at the same time when I cut the tree.

MR. PAINE. There is a question that Mr. Call did not feel qualified to answer and I would like to have you refer it to Mr. Parish, this question as to the structure of the orange and lemon, as to their difference in structure, so we can know why it is difficult to know which limb to cut off. I wish when you get his answer you would incorporate it in the report.

PRESIDENT JEFFREY. I am sure Dr. Parish will be able to explain that, and we will have it incorporated in the record.*

A recess was here taken until 1:15 o'clock p. m.

AFTERNOON SESSION.

PRESIDENT JEFFREY. The convention will please come to order. I wish to thank the members of the convention for the extreme courtesy you have shown the chairman. With 700 or 800 people in the room, if there were any contrary delegates it would be hard to control the convention. Now, we will have a paper on a very important matter. It will relate directly to the mottled leaf of the orange. The paper will be presented under the head of "Our Knowledge of Chlorosis," by W. S. Ballard, Mr. Ballard being connected with the Bureau of Plant Industry, Department of Agriculture.

MR. BALLARD. *Ladies and Gentlemen:* Before presenting this paper it might be well to offer a few words of explanation. The subject of chlorosis in citrus fruits has never been investigated to any great extent, and, therefore, we have no great amount of definite knowledge. When the subject is assigned to a pathologist to investigate, his first duty would be to determine what has been done and what is known in reference to chlorosis in other plants, and also to acquaint himself—which, of course, he should do beforehand—with the number of physiological processes that are going on in the normal healthy plant. It is with the idea of presenting to you the subject in somewhat the way he would take it up that I have prepared this paper.

OUR KNOWLEDGE OF CHLOROSIS.

By W. S. Ballard, Bureau of Plant Industry, Washington, D. C.

Before taking up the discussion of the subject of this paper, let us note first some of the characteristics of a healthy tree and review briefly a few of the fundamental processes in operation, noting some of the results that are obtained when these normal conditions are disarranged.

The first thing that strikes the eye in looking at a tree is the color of the foliage. The normal color of orange foliage is deep green. This is

*Dr. Parish states, in answer to this question, that he knows of no structural difference or arrangement between orange and lemon tree cells. He suggests that the whole trunk of an orange tree may have a tendency to grow in a spiral form and that between a tendency to grow straight. This would in a measure be in accordance with Mr. Call's observations.

due to the presence in the cells of the leaf of immense numbers of little green bodies which we call chloroplasts. Chloroplasts are small proteid corpuscles impregnated with a green pigment called chlorophyll, a word meaning "leaf green." Our present discussion is concerned largely with the functions of these chlorophyll bodies, or chloroplasts, in the process called photosynthesis. "Synthesis" means a putting together, and "photo" refers to light, hence photosynthesis is a constructive chemical operation which is brought about by means of sunlight. Briefly stated, carbon dioxide, or carbonic acid gas, from the atmosphere diffuses into the inner tissues of the green leaf, and water is brought up to these same tissues from the soil; then, in the presence of sunshine and chlorophyll (the green pigment of the leaf just mentioned), a chemical reaction occurs, and the carbon dioxide and water unite to form such complex substances as sugars and starch. Photosynthesis is, therefore, a chemical process by which the raw materials, carbon dioxide and water, are caused to unite chemically to form sugar. Neither sunshine nor chlorophyll alone is capable of bringing about this union, but sunshine in the presence of chlorophyll causes the reaction to take place quite rapidly, and to this manufacturing process the term photosynthesis is applied.

The extreme importance of this operation is evident when we remember that practically all the sugars and starch and other carbohydrate foods that we eat have their ultimate origin in this process. These substances are the food materials from which the cell walls and woody portions of the orange tree are built up by the living protoplasm. We see then that the growth of the tree, as well as the growth and production of the fruit, is particularly dependent upon the normal operation of the process of photosynthesis, and hence it is necessary that the foliage be in a healthy condition.

When the green color is replaced by a sickly yellow color, growth of the tree and maturing of the fruit is affected because the starch and sugars which are required as foods for growth are no longer being produced in sufficient amount by the defective chlorophyll.

The carbon dioxide used in photosynthesis diffuses into the leaves through small openings which are present in great numbers in the epidermis or outer covering of particularly the under surface of the leaf. The water necessary in the process is taken up from the soil, passes up the framework of the tree, and out into the leaves.

With this soil water come fertilizer elements and other soluble substances from the soil. More water than is required for photosynthesis is thus brought to the leaves, and the excess passes off largely in the form of water vapor gaining exit chiefly through the same openings by which the carbon dioxide enters. The fertilizer elements and other substances brought up in solution can not volatilize, and hence we have the stream of soil water passing up the framework of the tree and out into the leaves, there to be evaporated and leave behind some of those substances which are brought up from the soil. Thus a sort of boiling down process goes on. It has been estimated that a birch tree with about 200,000 leaves gave off something like 100 gallons of water during a single hot day, and a 115-year-old beech tree averaged nearly twenty gallons per day for the period from June 1st to September 1st. Obviously, then, a small amount of any deleterious substance taken up in

the soil water may by this process accumulate in sufficient amount in the leaves to completely disarrange their normal operations.

For while the process of absorption of soil water by the root system is by no means a simple sucking up operation, and is governed to an extent by a selective power of the living roots, yet deleterious substances can not be entirely eliminated. Indeed, deleterious substances in the soil water may act immediately upon the root system itself in such a way as to disarrange this absorption process, and the result may manifest itself in the loss of the healthy green color of the foliage. The interrelation of processes operating within the plant is so intimate that an effect observed at one end of a chain may have its ultimate cause in some unexpected factor operating at a far distant point.

Now, with more particular attention to the subject of this paper. Chlorosis may be defined as that pathologic condition of the foliage that obtains when the chlorophyll loses or fails to develop its normal green color. In extreme cases, as probably every orange grower has noticed, the green color is absent entirely and the leaves or spots in them are practically white. Between this extreme condition, and the normal green of healthy leaves, all gradations of yellows and light greens exist. The term chlorosis is, therefore, a general one, and has reference to that pathologic condition of the chlorophyll just described, regardless of how that condition is brought about and whether it be in oranges or other plants. A number of causes may operate to induce it. It was early recognized that iron is an important factor in the development of chlorophyll. It is known that iron does not enter into the composition of the pigment chlorophyll, but it is equally certain that when iron is entirely absent the plant is not capable of developing this green coloring matter, and the leaves remain white or yellowish. The amount of iron actually needed for chlorophyll production by the plant is very small, and in view of this fact it would seem doubtful if soils ever exist that do not contain an abundant supply. This would seem true even in spite of the fact that the application of iron salts to the soil, and as sprays applied to the foliage, has been materially effective in alleviating chlorosis of grapes in France. I will refer to this again.

When nutrition is disturbed chorophyll may fail to develop, and by some the dependence upon a supply of iron is thus explained. The nutrition factor is undoubtedly a very important, if not the all important one, and a number of causes may operate to so disarrange nutrition as to bring about chlorosis.

Starch, one of the food products which we have seen is manufactured in the green leaf, is insoluble in water, so in order to be transported to other parts of the plant, it must first be dissolved. The starches which we eat are acted upon in the mouth and intestines by certain substances called enzymes, which dissolve them and convert them into soluble sugars. A similar process occurs in the plant. The excess of starch which accumulates in the leaf during the sunshiny hours of the day is later dissolved by an enzyme and converted into soluble sugars, and so transported to other parts of the tree, to be used in growth and the production of fruit, etc.

If for some reason the dissolving of this starch is prevented, its very accumulation soon reacts in a way to cause the disappearance of the chlorophyll which took part in its production.

Now it happens that beside the starch dissolving enzyme there are present in the leaf others which we call oxidizing enzymes, and it appears that these oxidizing enzymes are capable of destroying the starch dissolving enzyme.

Tobacco, in certain localities, is seriously affected by a type of the disease chlorosis, and while the problem is by no means settled satisfactorily, it has been suggested that the train of coordinated factors responsible for the disease may be something as follows: An excessive nitrogen accumulation disarranges the nutrition process in certain leaf cells; this induces an excessive development of oxidizing enzymes, which in turn destroy the starch dissolving enzyme, and with the destruction of the latter there is no means of removing the starch supply when formed, and soon its accumulation reacts in the way mentioned before, to induce the disappearance of chlorophyll. Thus starting with a disarrangement of nutrition we end with chlorosis. Whether this explanation is correct or not we are not sure. It is possible, however, and I have mentioned it to call attention to the complex nature of the problem, chlorosis.

Finally, we should mention calcium carbonate, or limestone, as a soil factor capable of inducing chlorosis. Serious losses from chlorosis have been occasioned in the vineyards of France, and so far as treatment is concerned the grape has probably received more study than any other plant affected by this type of disease. Grapes in France are not affected except when growing on limestone soils. Chlorosis can be readily induced in normal healthy vines growing on non-limestone soils by placing powdered limestone in some form about the roots. Hence, it is generally accepted that an excess of limestone is the responsible factor.

Without stopping to discuss the various experiments that have been performed we may state that the application of a solution of iron sulphate to the soil about five to ten ounces in two and one half gallons of water, and in bad cases a supplementary spraying of the foliage with a one per cent solution of the same substance, has been the most successful single remedy. Some prefer to use commercial nitrogen fertilizers along with this treatment. The application is made in the spring, and the chlorotic foliage begins to take on its normal green color in a relatively short time.

We have called attention to the necessity of iron in the development of chlorophyll, but we know that the amount required is very small, and it has been shown that vines frequently become chlorotic when growing in soils containing an abundance of iron, as shown by soil analysis. Soil analysis, however, does not say much with reference to the availability of iron, *i. e.*, it may be present in abundance and yet not be in a form that can be taken up by the root system. All in all, it seems somewhat peculiar that iron salts, and particularly the sulphate, should be so effective in overcoming the trouble, and we are not able to satisfactorily explain its action. When applied to the soil it possibly reacts with the limestone to render the latter inactive, or it may reduce the alkalinity of the soil. The explanation of its beneficial effect when sprayed on the foliage is probably to be sought elsewhere. It might possibly be that this treatment would prove beneficial to chlorotic citrus trees.

With reference to the distribution of chlorosis in the United States it should be noted that it is a very common trouble in one form or

another throughout the arid West, and is not by any means confined to citrus fruits or even to tree or bush forms. Such plants as the tomato are frequently attacked. In Salt Lake City and vicinity it is common on peaches, pears, and apples, and is very noticeable on introduced ornamentals, and particularly on Lombardy poplars. The latter may completely succumb to the disease. In the San Joaquin Valley peaches are frequently attacked. I recently saw a badly affected block near Stockton. The trees growing along an irrigation ditch running through the orchard were more seriously affected than the rest. Apricots are frequently subject to the mottle-leaf type of chlorosis, but apparently do not suffer so much as peaches. I have examined some of the mottle leaves from apricots, and have found starch more abundant in the unhealthy than the healthy areas of the leaf, obviously an example of disarranged nutrition as mentioned before.

Among citrus fruits it has been my observation that there are at least two types of chlorosis. First, the mottle-leaf, variegated, or calico-leaf type, in which the chlorotic areas are in blotches between the lateral veins; and, second, the general type in which the whole leaf becomes uniformly yellow.

The first type may at times grade into the second. The type appearing in vigorous growing suckers springing from severely topped trees is probably a modification of one of the above. It might be noted here that the chlorosis of the grape, which is amenable to the iron sulphate treatment, is more nearly like the second or general type on citrus trees. The mottle-leaf of citrus trees is similar to a disease called variegation, and its cause and treatment may possibly be different from that of the general type.

Some species of the citrus genus may be characteristically resistant to chlorosis, just as among the grapes one species, *Vitis Berlandieri*, is not subject to chlorosis when growing in abundantly calcareous soils in which other species are killed by the disease.

I realize that this whole discussion has been anything but satisfactory to one who has listened for a solution of the problem. Problems in physiologic diseases are usually of an obscure nature, and since the whole subject of plant physiology is comparatively young, our information is not as complete as we might wish it to be. A new problem is, therefore, likely to open up a new field which has to be carefully explored before definite conclusions can be arrived at, and in the present discussion I have attempted to present the matter in a way to call attention to the complexity of the problem. We have seen that the disarrangement of one physiologic process may set in motion a long series of disarrangements, and in the end arrive at possibly an unexpected result. Chlorosis of citrus trees may be the final outcome of a long series of derangements, and we fail to recognize that anything is wrong until the end result arrives. The disease is usually, no doubt, due to a soil trouble, and if it is not due to an excess of lime then possibly some other factor, as the magnesium chloride ratio, to be discussed in another paper, or a combination of factors, that we have hitherto disregarded may be responsible, for besides the chemical aspect of soil problems, we have the physical and the biological, both large fields, and in addition we need to know the bad as well as the good results obtaining from the fertilizers, irrigation and cultural methods we employ. [Applause.]

PRESIDENT JEFFREY. Now, we will have another paper on the same subject, by Mr. R. R. Snowden—"Proportions of Magnesia to Lime in Relation to Nutrition." This paper will to read by Mr. Edgar A. Wright, of Los Angeles.

THE PROPORTIONS OF LIME TO MAGNESIA IN THE SOIL, AND THEIR RELATION TO NUTRITION IN CITRUS TREES.

By R. R. Snowden, Soil Engineer, Los Angeles.

Magnesia is a most important element of fertility in the soil, since it is absolutely necessary to the development of all plants; and yet it may, on the other hand, become detrimental.

Kearney and Cameron, investigating the effects of various salts on plant life when used separately, found magnesium chloride more than twice as injurious as sodium carbonate, or "black alkali," and magnesium sulphate or epsom salt three times as injurious. Although calcium chloride is itself inimical to plant life, they found magnesium sulphate 196 times as injurious as this salt.

Hilgard,[1] pointing out that these results are at variance with the general experience, fittingly suggests that the discrepancies are probably due to the presence of lime in some form in all alkali soils, and its well known powers in counteracting the injurious effects of saline solutions.

Magnesium carbonate, sulphate and nitrate, are of common occurrence in the soils of the California citrus regions, and were it not for the ubiquitous lime salts, their injurious effects would be much more prevalent and pronounced than they are. Indeed, so positive is the restraining influence of lime on magnesium salts that plants are more sensitive to differentiations in their proportions than to their actual quantities in the soil, within certain limits.

Loew states that the proportion of these two constituents in the soil is a more potent factor in the resulting crop than is generally supposed.[2]

The writer believes that he has traced several cases of malnutrition, and specifically of incipient chlorosis or "mottled leaf" in orange and lemon trees, to an excessive proportion of magnesia to lime in the soil, though it is certain that some cases are due to other causes.

Taking a typical case of this disease in lemon trees, he determined the principal constituents of the ashes of the leaves from the sick and the healthy trees respectively, as well as those of the soil of the affected and the thrifty area in the same orchard. The following table gives the percentages in the ash of the leaves:

	Potash.	Lime.	Magnesia.	Phosphoric acid.	Sulphuric acid.	Chlorine.	Iron.
Healthy leaves	8.33	39.91	3.49	0.39	3.50	.348	.216
Sick leaves	22.34	28.85	3 22	4.57	5.30	.487	.162

The potash, as shown, had increased in the sick leaves to more than two and one half times that in the healthy leaves, and the phosphoric acid to more than eleven and one half times as much, while the lime had suffered a severe decline.

The chemical constitution of these soils by no means parallels that of

[1] "Soils," E. W. Hilgard.
[2] Bulletin No. 18, Division of Veg. Phys. and Path., U. S. Dept. of Agriculture.

the corresponding leaf ash, and hence could not be responsible as a whole for the variations in the latter. Potash and phosphoric acid are practically the same in both soils, while the lime is three times as much in that soil where it is least in evidence in the leaf. The only striking difference in these soils is the fact that the proportion of magnesia to lime as well as the actual quantity of each is considerably larger in the affected than in the normal area.

This observation, in view of the untoward tendencies of magnesia, led to the suspicion that the proportion of magnesia to lime found in the affected area, namely, 1 to .49, would not be tolerated by the lemon.

That the chemical constitution of the leaves of citrus trees is not constant is shown by the difference in the analysis of the orange leaf as given by different authorities. One finds half[3] as much potash as phosphoric acid, another three and one fifth[4] times as much, while another five[5] times as much, and still another seven[6] times as much; the range of potash from the lowest to the highest compared with phosphoric acid being 1400 per cent.

One finds twice as much[3] lime as phosphoric acid, another seven and one tenth times as much,[4] and still another seven and one fifth times as much;[5] the range of lime compared with phosphoric acid being 850 per cent.

One finds two and one fifth times as much[4] lime as potash, another three and two fifths times as much,[5] and still another four times as much;[3] the range of lime compared with potash being 182 per cent.

These wide discrepancies the writer attributes to this very factor of varying proportions of magnesia to lime in the soil.

Pursuing the investigation, determinations were made of these two constituents in a number of soils where the condition of the trees was known, and the results as shown in the following table seem to justify the conclusion that just so soon as the percentage of lime in the soil becomes less than double that of magnesia there is derangement of nutrition in the orange trees, but the lemon appears to be much more tolerant of the evil. This is probably why mottled leaf is far more frequently seen in the orange than in the lemon.

The apparent exceptions to this rule found so far are easily explainable.

ORANGE TABLE.

Laboratory number.	Percentages found: Magnesia.	Lime.	Proportions: Magnesia.	Lime.	Condition of tree.
242	.07	.24	1 to	3.43	Thrifty.
240	.10	.29	1 to	2.90	Thrifty.
326	.19	.48	1 to	2.53 X-1	Somewhat mottled.
374	.13	.32	1 to	2.46	Very thrifty.
339	.28	.58	1 to	2.07	Color fine.
373	.078	.16	1 to	2.05	Thrifty.
246-7	.49	.97	1 to	1.98	Thrifty.
372	.09	.17	1 to	1.90	Somewhat mottled.
338	.21	.28	1 to	1.34	Badly mottled.
410	.39	.44	1 to	1.13	Young leaves badly mottled.
409	.41	.37	1 to	0.89	Young leaves slightly mottled.
311-3	.71	.45	1 to	0.64	Very unthrifty.

[3] California Bulletin No. 93.
[4] "The Cultivation of Citrus Fruits," Jos. Hillman.
[5] Report of the Work of the Agricultural Experimental Stations of the University of California for 1894-95.
[6] Florida Bulletin No. 138.

X-1, number 326, being far above the hypothetical "dead line" with 2.53 parts lime to one of magnesia, would seem to contradict the assumption made above; but this is a heavy clay soil and the lime is below the minimum of adequacy regardless of magnesia.

LEMON TABLE.

Laboratory number.	Percentages found: Magnesia.	Lime.	Proportions; Magnesia.	Lime.	Condition of trees.
226	.11	.38	1 to	3.41	Very thrifty.
408	.25	.37	1 to	1.51	Color good.
411	.33	.28	1 to	0.84	Color good.
296-7	.12	.08	1 to	0.67	Slightly mottled.
256-8	.49	.24	1 to	0.49	Decidedly yellow.

The line of safety appears in the lemon table to lie somewhere between 0.67 and 0.84 part of lime to one of magnesia, but in neither case is it to be sharply drawn because of the operation of other and minor factors. But there is sufficient evidence in the tables to show that the conclusions drawn are not without foundation.

It should be mentioned here that all the soil work done in connection with this investigation has reference only to the available materials, ignoring entirely, except in the case of potash, that portion of them that is insoluble in weak chlorhydric acid (1 in 5) with about one minute's boiling, excepting also that weak nitric acid is substituted for chlorhydric in the phosphoric acid determinations.

It might be profitable to consider the reasons why an excessive proportion of magnesia to lime in the soil is detrimental. The writer believes this to be in part a question of solubility.

Lime as carbonate is necessary to the trees, but the carbonate requires an acid solvent to render it available. The carbonic acid of the soil, however, is sufficient ordinarily for this purpose. But where magnesium carbonate occurs with it in sufficient quantity, the latter will lay first and superior claim on this acid, producing an alkaline solution in which the calcium carbonate is practically insoluble.

Experiments made by the writer to determine the extent of the restraining influence of magnesia on the solubility of lime salts gave the following results:

(*a*) One gram each of magnesium and calcium carbonates were shaken well with water containing much carbonic acid. Twenty-three per cent of the magnesia with a mere trace of lime went into solution.

(*b*) One gram each of magnesium carbonate and calcium sulphate were treated in the same way. Eighteen per cent of the magnesia and 7 per cent of the lime were dissolved, the latter being seven tenths the normal solubility of lime in the form of sulphate.

(*c*) A portion of soil, number 256-8, containing twice as much magnesia as lime, shaken with a sufficiency of water yielded nineteen times as much magnesia as lime to solution. The trees growing in this soil unable to assimilate sufficient lime to supply their needs, absorbed the larger amount of potash noted in the yellow leaves, to supply the deficiency of bases, the salts of potash being independent of a condition of acidity for their solution. Doubtless the potash carried along with it the increased quantities of the acids also noted.

It will be observed that magnesium carbonate rendered the lime in the form of carbonate practically insoluble while it was unable to restrict the solubility of the sulphate beyond three tenths of its normal solubility, possibly indicating the superior availability of calcium sulphate over the carbonate in the presence of large proportions of magnesium salts.

Loew has also investigated the physiological side of the relations of these two soil constituents to plant life, and reaches the positive conclusion that lime salts are the antidote for magnesium salts. In his experiments he found that lime without magnesia produced "a dense forest of root hairs"—to use his own words, while magnesia without lime produced only a few short hairs, and suggests that this explains why plants are able to absorb increased quantities of potash and ammonia salts after being manured with lime salts. It is thus seen that when a sufficiency of lime is available to the plant its feeding capacity must be much more extended than without it. It is, therefore, patent that whatever interferes with the assimilation of lime hinders the development of the feeding rootlets and must thereby disturb nutrition as too much magnesia is seen to do.

The wide prevalence of this hostile soil condition is witnessed by the fact that in thirty-two soils examined, from the vicinities of Santa Ana, Tustin, Rivera, Whittier, El Monte, Covina, Charter Oak, San Dimas, Pomona, Ontario, Pedley, Corona, Imperial Valley, Hinkley, Glendale, and Los Angeles, only thirteen met the requirements of the orange with regard to proportion of lime to magnesia, while nineteen fell under the ban of the supremacy of magnesia.

Since lime is depleted by the processes of nutrition more rapidly than is magnesia, it is not surprising that many citrus trees after flourishing for a time ultimately show the effects of the relative exhaustion of lime, notwithstanding that its actual quantity in the soil might still be above the ordinary minimum of adequacy; hence it must be more than a coincidence that while the writer has often wondered that this well recognized subordination of lime to magnesia is so generally ignored, the citrus orchardists also have been wondering why their trees are so often mottled and sometimes unprofitable.

Who can tell how much of the failure to set fruit, dropping of fruit, deficiency in quality of fruit, and other manifestations of weakness on the part of the tree is directly or indirectly due to this condition, since, as it is well known, a weakening of the organism, whether vegetable or animal, renders it more susceptive to the attacks of all its enemies of whatever kind. Certain it is that the oranges most famous for their fine quality are grown on land that is very rich in available lime. As widely as we have seen the analysis of the orange leaf to vary, the fruit is subject to like variations in the proportions of its constituents. The University of California found the lime in the fruit to be equal to 26.5 pounds in a car load, while Hillman found the average of a large number of widely divergent analyses to be 115 pounds. It is surely by no accident that this is so. Certainly then some peculiarity of soil condition predetermines this, and the writer attributes this also to the relations of lime and magnesia or some analogous condition, without the proof, however, at the present time.

MODIFYING CONDITIONS.

Magnesium salts being more soluble, are also more mobile in the soil than calcium salts; hence the capillary efficiency of a soil may exercise a direct influence over their mutual relations. The relations of magnesia and lime may be modified by judicious use of irrigation water, and by efficient use of the mulch.

The proper balance of the two may be maintained by adequate additions of lime in a suitable form, the sulphate being apparently the best.

CONCLUSIONS.

(1) Many citrus orchards are probably close to the limit of tolerance, but are maintained in a state of moderate thrift by the generous applications of superphosphates they are receiving, owing to the large percentage of calcium sulphate they contain whether made from rock phosphates or bone. So many cases of mottled leaf have been cured by the use of superphosphates that this trouble has come to be attributed to a lack of phosphoric acid, when in fact it is doubtless due to a lack of lime and probably the sulphate. This mistake is most natural, since the trouble might be manifested in the presence of what would be a sufficiency of lime when its relation to magnesia is neglected. (2) The water supply as well as the fertilizer materials should be rigorously censored against the undue introduction of magnesia into the orchard soil.

[Applause.]

MR. MASKEW. In relation to the paper just read I have been requested to make this announcement:

Should this work prove of any value to the citrus orchardists, the credit should be given Mr. W. S. Sparr, since he not only suggested that the work be undertaken, but also made it possible for me to undertake it.

R. R. SNOWDEN.

PRESIDENT JEFFREY. Is the convention ready to hear the report of the Committee on Resolutions?

MR. CALL. We wish the secretary of the committee to read the report, and then, if it please the convention, I would like to add a few remarks.

MR. SMITH. Before reading these resolutions, I want to say, on behalf of the committee, that, as you will remember, your chairman suggested that any resolutions that might be offered by any member of this convention should be submitted to the committee. A number of suggestions on matters of value to the citrus fruit industry have been handed in, too many to be made part of these resolutions. These resolutions, as you will see, provide for a committee of seven. Those suggestions of value are all filed and will be handed to that committee when appointed and ready to serve, and they will take cognizance of those and act upon them. We thank each member of this convention who has shown his interest in the matters before the convention by presenting those suggestions. Our committee desired to make the resolutions short and to the point. They are as follows:

To the Members of the Thirty-seventh State Convention of Fruit Growers:

GENTLEMEN: Your Committee on Resolutions do hereby offer the following resolutions for your consideration:

1. *Resolved*, That it is the sense of this meeting that the facts as presented and discussed at the sessions of the convention in relation to the decadence of the older citrus fruit orchards, as substantiated by the available statistics, fully justify the State Commissioner of Horticulture in calling this convention; it is further

2. *Resolved*, That in view of the facts brought out in discussions, relating to deterioration in older citrus fruit orchards, which we believe can be remedied by scientific research, and emphasized in many communications to the State Commissioner, and realizing the magnitude and far-reaching consequences for ill to the citrus fruit industry, if these matters fail to receive the needed attention; and bearing in mind the great and beneficial results that have come to the citrus fruit industry of this State through the investigations of G. Harold Powell and R. S. Woglum, as instituted by the United States Department of Agriculture, it is the sense of this convention that an appeal be made to the United States Department of Agriculture for a special investigation into the causes of decadence in older citrus fruit orchards, and that we also invite the attention of the State Agricultural College to this subject.

3. To further promote the wishes of this convention, it is resolved that a Committee of Seven be appointed by the Chair to present the facts to the proper authorities, and to secure from the Congress of the United States the necessary appropriations for carrying on the work of such investigation, and to take such further action as may appear desirable in the premises, such committee to be approved by a committee of three appointed by this convention.

4. *Resolved*, That we commend the work of the Pathological Institute at Whittier, and that of the Experiment Station at Riverside, but we deplore exceedingly that at a time when his services were desired, a six months' leave of absence should be given to the Superintendent of the Pathological Institute at Whittier to attend to other and private interests.

5. *Resolved*, That we commend the helpful interest and work of Pomona College in all matters pertaining to the interests of citrus fruit growers.

Your committee also suggests that the convention tender a vote of thanks to the local committees for their efficient services in preparing for the convention, and to the people of Pomona for all courtesies extended to visiting delegates.

The committee also recommends that a vote of thanks be extended to all who have prepared papers and taken part in the discussion, and heartily commends the chairman for the manner in which he has conducted this convention.

Respectfully submitted,

N. W. BLANCHARD, Santa Paula.
A. F. CALL, Corona.
FRED J. SMITH, Pomona.
THOMAS STONE, Pasadena.
DR. J. ALLEN OSMUN, Whittier.
B. B. WRIGHT, Riverside.
ROY K. BISHOP, Orange.
J. L. HARDEMAN, Porterville.

MR. CALL. Mr. Chairman, I desire to move the adoption of the report, and in connection with it I would like to make a few suggestions.

The motion of Mr. Call was duly seconded.

MR. CALL. *Ladies and Gentlemen:* These resolutions are of far reaching importance to the citrus industry and deserve careful consideration. I realize that we have a great divergence of views on some of these questions. I noticed that more particularly last winter in going around over southern California with Mr. Chase, Mr. Woodford, Mr. Hampton and others, in gathering statistics for the Interstate Commerce Commission with regard to this industry. We found that in some localities there appeared to be no decadence in any kind of citrus fruits, although we found old orchards. We did not find what we regarded as decadence in any lemon growth nor in any seedling orange growth nor in any grove of bloods, and I guess I might say of sweets, but we found in some localities a very marked decadence in quite a large percentage of the older navel orchards. When we got all through, after spending five or six weeks at the work, making careful investigation as to acreage, having a committee in every locality estimate the acreage and give it to us by numbers and names so we could verify it and compare with the assessors' returns of trees in bearing, we found this to be the fact, that in the last six or seven years we had doubled the acreage of bearing citrus groves without materially increasing the output, and which had resulted in a very large increase in the expense of

production per tree. At Corona, where I live, we had 2,500 acres of orange trees from fourteen to eighteen years old and our production was on an average of one car to five acres, or less than 100 boxes to the acre. Our highest was one car to four acres. Riverside was 10 or 20 boxes better, and Redlands a little better, and Highlands had the highest output, of about 140 cars. We came around this way and looked over every colony; we found the old orchards were not bearing as they should. It will be said that that is due to want of care, and this committee has no quarrel with that decision. We do not antagonize a single view that has been presented, because we simply take the position that we don't know. All we say is that this is a condition that is worthy of investigation, and citrus growers should not be afraid of the truth. Now, the truth may hit in different ways. When the assessor comes around to assess your groves, you are not boasting particularly about the production of that grove. When the Interstate Commerce Commission comes around and says, "We are going to fix these rates somewhat upon the productivity of this property and inquire whether the investment pays," you are not particularly anxious to put the fancy groves to the front. You are willing to take the average truth. And when congress inquires into this matter as to the tariff, you are anxious about the matter of protection. But when you have got a grove that is a little decadent, and you want to find a fellow to buy it, you don't want a resolution to go out that some of the orchards are not producing as well as before. But the absolute truth, I think, of this matter will strike an average of our condition and give every man all that he is entitled to have. I hold that a man who puts off a poor orange grove on to a tenderfoot is doing a worse thing than if he held a pistol to his head and took his money, because then he is simply taking what money he has on his person, while in the other case he takes the earnings of a lifetime. [Applause.] These resolutions are not aimed at any industry. We don't say your tree is beyond recovery. We believe this industry is on the uplift; we believe we are going to conquer all our troubles, but we want the government help to do it, and that is all we say by these resolutions. [Applause].

The motion to adopt the report of the Committee on Resolutions was carried.

Mr. C. C. Teague, Mr. P. J. Dreher, and Mr. A. F. Call were duly nominated and selected as the Committee of Three, referred to in the resolutions.

On motion of Mr. Paine, duly seconded and carried, any or all of the members of the Committee of Three, whom the chairman might wish to appoint as a member or members of the Committee of Seven, provided for in the resolutions, were authorized to resign from said Committee of Three.

PRESIDENT JEFFREY. Now we will have an address—"Cultivation, its Relation to Plant Disease"—by Mr. Macoun, Assistant Superintendent of the Arlington Heights Fruit Company. [Applause.]

CULTIVATION, ITS RELATION TO PLANT DISEASE.

By D. B. Macoun, Riverside.

MR. MACOUN. *Mr. Jeffrey, Ladies and Gentlemen, and Gentlemen of Pomona*: I think there is something due to you to-day, perhaps, more than to other districts of California. It is said to-day that you have magnificent orchards and also that you have a bounteous crop. From other districts we have not had those reports, and I must say that you must be doing your business better than any other districts, especially in Riverside, where our Commissioner did say that our crops had not come up to the crops of years ago. The question comes up, What is the reason? In your resolutions I don't think you cover it. If you state that malpractice, malnutrition, was the cause of decadence, I believe you would hit the nail on the head. I don't believe for an instant that the age of a navel tree is fifteen years; I don't believe it is twenty years, nor yet do I believe it is thirty or thirty-five. In starting out in life with considerable money, virgin soil, an orchard well looked after, and at the age of twenty it is an old orchard, is it not a terrible thing to think of? I have thought of raising an orchard for myself and family, and, very likely, those who are to follow them. To-day I leave the convention with the opinion that fifteen to twenty years is the life of a navel tree! I say emphatically I don't believe it.

When I heard what was said here to-day it put me in mind of a story about a friend of my own; he was a journalist, an Irishman from the west coast of Ireland. He was sick and they thought he would not get better. They asked, "Were the people you sprang from of a vigorous race? Were they long lived?" He looked at them and said, "Doctor, it all depended on the government in power." His forefathers had been hung for treason.

The life of the navel tree depends on the man in power; it is the man who has control of that orange orchard. We are dealing in orange land; it is a case of barter and sale. We plant a tree which should never be planted; we plant a tree without knowing the class of soil. Who among you has, even in your old orchards, dug down six or seven feet to test the soil? How many here to-day, if asked that question, could raise their hand? How many here to-day after they have dug down have had that soil analyzed to find the minus quantity? Is there a man here to-day that has done that, with all the thousands and millions involved in California?

As I said before, it is not the decadence of the orange tree; it is the decadence of the man who is running and governing and controlling the interest of that tree. [Applause.]

I am a great believer in Professor King, a man whom you will have among you here in California. I believe there is no peer of King and Hopkins in the United States. King says: "The soil is not a grave where death and silence reign, but rather is a place where the cycles of life begin anew to run their course, over and over again." Take it ten years ago, before we had a fertilizer law. What were our orchards then? A dumping ground. Was it not a dumping ground for all the fertilizer that any fertilizer man could sell you? We knew nothing about nitrogen, phosphoric acid, lime and humus. To-day we know more. We know, by the investigations of the pathologists, that

fertilizer men are good men to-day because our laws are beneficial to the farmer. Business is business to-day, and the fertilizer man will chew the meat of an orange tree and tell you it needs phosphorus, and perhaps we buy it. He will never tell you that it is the physical condition of the soil that is wrong, and here are a few things that I believe in. Soils are never exhausted of their potential plant food. Worn-out soils are not exhausted chemically but physically. Their humus has been used up. Soils once productive but now unproductive may be restored to their former state. That is as true as it was a hundred years ago. You take France in the sixteenth and seventeenth centuries and what do you find? That with a population a great deal less than they have to-day they were unable to grow crops to feed the people they had then. With improved methods of cultivation, what have they got? They have a population equal to that of Belgium. Take England—33 bushels to the acre; Germany, 28 bushels to the acre; United States, with virgin soil, 14 and 15 bushels to the acre. What is the reason for this? You must look at the place where the tree is planted, and that is the soil. You follow this thing through the centuries that have gone by and nearly every people have worn-out their virgin soil and just come to the place where we are to-day. In the Genesee Valley in its old days, Illinois, the Dakotas, Manitoba and the Northwest Territory. What do you find? The virgin soil producing crops for a number of years, farmers taking up all they can get, and what have they got to-day? Just the same results; you have farmed a virgin soil. You say I should put in fertilizer; you have, but you did not put in the right kind of fertilizer. From the day it was planted out you should have been growing cover crops. Take, for instance, the working of a ten-acre orchard as it is worked in California. I don't say my orchard is good; I say it ought to be better. I can prune off my own mistakes. For every one of those things we are talking about I believe in pruning. Take a tree ten years old, lopping off branches that cost money to grow. Is there not something wrong? Some of those branches are dead at the end. I am not talking of that lateral wood that was suffocated for the want of light; I am talking of branches on the tree that took money to grow, and here we prune them back. The old saying is the doctor buries his mistakes in the ground, but ours are standing before us every day in the orange orchard. Then a man comes along and we prune them back to cover up our mistakes. For instance, I plant an orchard here. Take Riverside soil; I am better acquainted with that than I am with any other. The first years, under the old way of handling an orchard, it was fallow, it was open cultivation, and years rolled on and it was open cultivation, and on every ten acres I had two inches, which gave me for six weeks' cultivation ninety inches of water. It took that ninety inches of water to irrigate the ten acres. When that orchard came to be fifteen years old I had more water than I could use. And the trees needed double the amount of water. Now, what is the reason? From the very methods of our cultivation and in growing cover crops, we have made a soil hard, intense, unable to be ventilated or aerated. If you don't get good air introduced to your trees you will have all the troubles Mr. Ballard and the others have been talking of. I believe those all come from soils that are not well aerated, not well ventilated and not well drained—every one of them, and more especially aeration and ventilation. Take California here to-day. You have a

family doctor. The first thing he tells you is to have a screened porch to sleep on. Why? It is simply for better air. Did you ever think that the environment of a tree had to be just as comfortable as your own? Is it not possible that that very oxygen, so necessary for ourselves, should come down through the ground and be there at its roots and around its roots every day and night of the year? Plowing under all kinds of fertilizers and examining the ground on top, show that neither gases can get out nor air get in.

I believe trees are almost immune from some diseases. Take gum disease. We find that we can cure gum disease by cultivation, doing good work in that part of the orchard where we can work a four-horse cultivator, hoeing under the trees, then digging around those old trees and exposing the crown. We can cure gum disease just by that method alone. In talking last summer with a pathologist here, I asked him this question regarding wither tip. If I have an orchard afflicted with wither tip, and everything is suitable, what will bring it on? Will lack of cultivation bring it on, lack of proper ventilation and aeration? Will the weakening of the tree under those conditions bring it on? He said it would. I know full well that to irrigate a tree that is drying, the leaves drooping, it droops in dry soil—to turn water on it the conditions are going to be bad afterward. Mr. Galloway, Chief of the Department at Washington, says it will start conditions in that tree that will know no ending. Some days the roots of our trees are dry and some days they have more moisture than is necessary, and still we follow the methods followed ten years ago. The trouble with us to-day is that we are not living up to the best we know. There is not a report from any of those experimental stations to-day but will teach us how to better the health of the tree. Just an instance, some of the work we do. I call it marking out. I mark out a piece of land for irrigation and I mark out the mulch; it may be five or six inches deep. I have then ninety inches of water and I run on that. I mark the mulch out and the hardpan formed underneath, how many days will it take to penetrate? It will take a day and a half, and the mistake is that by not breaking up that hardpan you have lost the success of an irrigation; no water has gone down to the depth. I will tell you a case in point. Five weeks ago I irrigated ten acres of lemon orchard. The mulch was marked out. Three weeks afterwards I marked it out by putting a weight on the bottom of the marker. I put on 170 inches. Would you see any difference in the growth of those trees? You would. A man would say it was well looked after. And that thing follows all through the summer work.

Regarding the depth of cultivation, every man should know his own land to the extent that he should know how deep he should cultivate. Cultivation in the summer months means conservation of moisture. If it is deep enough to conserve moisture it is deep enough to air the roots. It is impossible to say, "I cultivate three inches, four inches and five inches" and put it as a standard. Every man must know his own soil. Some soils to-day on Arlington Heights we cultivate three inches. Years ago we cultivated six. The result was mottled leaf. For the last twelve months we have cultivated three inches deep. We have changed it from a mottled leaf to a good dark leaf. Why? Simply because we did not turn the humus out. We paid fertilizer men considerable money in leading fertilizer to those sandy orchards and then we culti-

vated six inches. What was the result? Mottled leaf and weakened tree. The want of humus means starvation to a tree or grain or anything you may wish to grow. The depth of cultivation on the granite soils that we have there just simply means this, that I have to cultivate a depth sufficient so that on six weeks' irrigation it will absorb ninety inches of water. No man can tell another how deep he should cultivate. It is a strange thing to me; I can't see how he can. The very condition of the soil, what the soil is derived from, is a controlling factor in the depth I would cultivate. The arrangement of the soil and capillary attraction have a great influence on the depth I shall work the soil, both in the summer and the winter.

Another thing about renovating the soil, making it a fit place to grow a navel tree that will live longer than fifteen years. If I thought a navel tree would only grow fifteen years I would go out of business to-morrow. Our method of handling stable fertilizer is, we plow it under in the winter months with a disc plow. How much of that soil is affected by that fertilizer? I mean, how much soil is physically changed? Not one inch below the depth of that plow. You can pile on all the manure that it is possible for an orchard to take and the physical effect will be the depth of that plowed soil. From year to year, without the growth of cover crops, that has been getting harder, more intense, less liable to take water or throw off gas. Aeration and all those things that affect trees are not thus improved by the growing of cover crops. We will have a chance, with the roots of those cover crops, to penetrate that hardpan and make it a fit place for trees to live. I believe the trouble with two thirds of our trees is that their roots are suffocated. I believe that they are getting neither air nor water only through the medium of holes put there by cover crops. We sow our cover crops. We are irrigating and cultivating with a four-horse team, six inches, seven inches. That irrigation hardpan forms; it may be four inches, it may be three inches. What have we done to break that up? If I was growing grain I would not sow on a place like that. I would go in there and tear up that irrigation hardpan. Give the tender roots that the vetch will send out a chance to penetrate to the depths. You expect the tiny roots of the vetch or the peas to break up that hardpan. Is that wise? Shouldn't we break that and know that the roots can penetrate to greater depths?

Another thing I want to speak of, the drilling in of fertilizer. What does King say? King says that fertilizer put in shallow in this country—of course, it is irrigated and dissolved—where do you find the greatest amount of that as returned in the soil moisture by evaporation? By capillary attraction. You will find the greatest amount right underneath your mulch and out of the zone of the trees, to the extent of what King says of 200 or 300 pounds per acre. It is a considerable quantity to have above your root zone. It is a considerable quantity to have where your roots will come up where eventually they are going to be affected by the heat of summer and the warm winds. Don't you think deep cultivation has something to do with keeping a normal condition under that mulch? One hundred and eight under a good mulch affects the tree very little. I have taken the temperature and there is all the difference you could imagine between a hot day and a cold day.

Now, those are some of the things to-day that I believe have brought about the decadence of our orange groves. I don't believe that all trees

are going to be long lived, because all trees are not put on the kind of soil they should be. We have dug down in our soil six feet; we have taken samples, we have had them examined for magnesia, potash and lime; and on the Heights you will find the difference as wide as the poles, as far as the compactness of the soil goes, as far as the soil is able to retain moisture, and those things that go to control the general health of a tree. I believe in pruning just as thoroughly as Professor Paine, but I think we start too young. At the time he was pruning his trees there should have been vigorous tops. I believe that by proper methods of handling our orchards, winter and summer, by keeping an even temperature, by proper cultivation, never allowing the roots to get dry, always a proper amount of moisture, a tree will grow into normal condition and you won't have to bother your head about where the seeds came from or where the buds came from or who grew the nursery stock. As regards the old trees, that is beyond our reach. I believe in plant selection. I had something to do with the selection and handling of plants on an experimental farm in Canada; I had it nine years. We were able in ten years to raise the latitude of growing wheat as far north of Ottawa as New Orleans is south of Ottawa. We are growing wheat in the Arctic Circle. The vital question with us to-day is the orchards that are fifteen, twenty-five, thirty-five, and forty years old. I saw the oldest orchard to-day in Riverside county; it belongs to Mr. Burney. I saw some of the trees just as good as they were fifteen years ago; I saw others that were dead or dying. To-day I came by one of the first trees planted at Riverside. That tree is just as healthy and strong as it was twenty years ago, in better shape, in better condition, I believe, for at the present time it has proper cultivation and proper nutrition. [Applause.]

MR. CALL. I want to say that the Committee on Resolutions left one resolution until the last, and that is a resolution that I now offer and move the adoption of, that this convention tender its most hearty thanks to our President, our able Horticultural Commissioner, for his efforts in our behalf and for bringing this convention at this time and giving us the benefit of his views and information and all the help he is continually giving to southern California.

The motion of Mr. Call was duly seconded, and the resolution unanimously adopted by the convention rising.

MR. GRIFFITH. I would like to ask Mr. Macoun a question. I have listened to-day and yesterday to some valuable papers. It is evident to me from what he and others have said that we are forming more or less hardpan under all our soil; that is, that our soil is becoming compact under the plow share. If I plow with a deep plow, or if I subsoil, will I not tear up the feeder roots between the trees, and if I do, shall I fertilize that same soil with the feeder roots all cut out?

MR. MACOUN. I might say to the gentleman who asked that question that what I meant to say and what I would say now is this, that in plowing an orchard, the question is, how are you going to plow, how disturb that soil? There is no implement made that you dare use. The only means that we know of to-day is by cover crop. We have, by bad farming, got a condition in our orchards, a condition under that part that we have been plowing and cultivating and killing, that we dare not use the implements we have, and the question is simply this: How am I going to disturb that soil that is formed right underneath

the plow sole? To me that is the most vital question in the orchard to-day, that part underneath the plow sole down to the tree zone. It is a depth of ten to twenty-two inches. I can disturb the soil, I can keep it in good physical condition for eight or ten inches on top, by cultivation, by plowing, by stable fertilization, by straw, by any decaying vegetable matter, but how are you going to keep in condition the soil below? Only by cover crop. I look upon the cover crop as the salvation of the orange orchards of California. For every one of those roots is moving more or less particles that had become solid, particles that had become cemented together, and as those roots decay they allow water to percolate to the lower depths. Take some of our old orchards to-day when we plow them and the particles do not break. What is the reason? Bad physical condition. And I believe this, a good physical condition—I don't say it is a panacea for all your ills—aye, not by any means, but followed year after year it will give us a healthy tree, it will give us water underneath where water has never been able to go through. If we only can, through some ingenuity, find something that will disturb that soil right in the root zone.

MR. GRIFFITH. What kind of cover crop?

MR. MACOUN. We are using vetch to-day; we have used Canadian peas.

A MEMBER. How deep do the roots go?

MR. MACOUN. I have measured roots of vetches twenty-five inches. There was an experiment carried on by Doctor Porter; some three or four years ago they carried on experiments in Arlington Heights. He gave me the vetch to plant; I planted them. He measured the depth of soil; the roots were thirty-five inches. Those roots had no obstacles against them; they had good loose soil. I have measured the roots that we have grown on some of our own land—ten inches, fifteen inches. I sowed those vetches I am telling you about on hardpan. The roots struck the hardpan and moved on away horizontally. Some of them penetrated through, others did not. The proper handling by a grain farmer, when he would find a formation underneath the surface soil, would be to put a plow on and plow it up. If he got that soil in good condition he would then sow his grain. He would have an idea that the roots then would have a chance to go down and be well fed on going down. The orange farmer sows right on that hardpan and expects the roots to go through and give him a great crop. If we, in the fall, in August or September, plow deep enough to break that hardpan and turn around and sow our vegetable upon it, we have done good farming. You have then a soil that is mellow and you will have a chance for a crop, and without it I don't see how you can.

MR. PAINE. Would you have us here in August and September, before we sow our vetch, do a heavy plowing; and whether it is destructive to roots to do so?

MR. MACOUN. The only plowing I ever do in August or September is for breaking up a hardpan; I would plow just so deep and not any deeper than would break up that hardpan. Some of you may say it will destroy the growth of the trees. I plowed 150 acres of lemons last year for no other reason than to break up the hardpan that I might get water to the lower depths, and that those lemons might grow and come into the market when we might get something for them. It is easy to grow lemons so you can pick them in the winter time; it is much harder to

grow them and pick them in October. I thought by plowing I would increase the growth of that tree, and I believe we did; I believe that we made money last year in plowing our lemons in September and breaking up that hardpan and getting the water down good and deep.

PROFESSOR COOK. I was a little in doubt as to what Mr. Macoun meant by pruning. How early would you commence pruning lemons and oranges?

MR. MACOUN. I take the suckers out of young trees at all times after they are planted. The regular pruning starts with us about four years old.

A MEMBER. Suppose your hardpan went down eight inches, how would you get to it?

MR. MACOUN. I would go as deep as necessary.

A MEMBER. Some of it is ten or twelve inches deep.

MR. MACOUN. That is a different kind of a plow sole from what I am talking about. It forms between every irrigation. There is no cultivation that you do in the summer time but what that forms from the depth of two or three inches. It is impossible to irrigate and not have that form. That irrigation hardpan I am speaking of. I am not speaking of that irrigation hardpan down twelve or fifteen inches.

MR. KOETHEN. Do you plow the same depth that you cultivate, as a regular practice?

MR. MACOUN. Are you asking me in winter plowing?

MR. KOETHEN. Yes.

MR. MACOUN. I plow deeper.

MR. KOETHEN. Why?

MR. MACOUN. I want to cover up, in the first place the cover crop that I have already grown, to a sufficient depth that its decay will be rapid; and, secondly, I do that to get a depth that will give me a good working mulch for the coming summer. The man that does not get his orange grove or lemon grove in good physical condition before the month of May or June is up against it all the year. You can hear the teeth of his cultivator rattling over those dry bones all summer.

A MEMBER. I would like to ask Mr. Macoun what is the effect of getting so much extra water into his soil in September. Does it not result in giving you too large a percentage of moisture?

MR. MACOUN. We were getting no water at all in. The irrigation hardpan had formed so hard underneath that the water would not penetrate in a three days' run. I plowed deep enough to plow that up, marked it out again and put 170 inches of water in it. This year we got sixty and seventy inches.

A MEMBER. The question I wanted answered was, does this application of so much water to an orange tree in September result in large sizes? Many horticulturists tell us that we should withhold the water at that time. We can not do it and raise a cover crop.

MR. MACOUN. I will say nothing about that. The reason we did this work, the reason I want to break up the hardpan, is for the roots of vetches to go down in the soil where the Lord intended they should go. It is to break up that hardpan, so the roots of trees and vetches may go down and make passages for water to go down.

A MEMBER. I would like to ask Mr. Macoun if he has ever tried sowing grain with his vetch. We are doing it this year.

same stock and the same nursery, are mentioned more particularly from the fact that he has been personally cognizant of the conditions existing in such during all this time. Three have received the best of care and been remunerative from start to date, producing slightly over four hundred packed boxes of fruit to the acre annually, since arriving at full bearing capacity, with even a better showing for the coming season. The fourth orchard was sold about nineteen years ago to a man who evidently did his best to learn how much neglect of essentials in the care of trees could be given and yet retain vitality enough to produce one half box to the tree. About four years ago the present owner purchased this orchard, and to-day the indications are that the yield will be equal to the other three.

Mr. S. L. Spencer, of Irwindale, summarizes the situation in his district in the same manner as Mr. Hodges, hence it would be only a recapitulation to say more. He mainly confined himself to the evident causes of deterioration and best methods for rehabilitation.

Mr. W. E. Dougherty, of Azusa, whose knowledge of the extensive groves in that section embraces a number of years, writes that he does not know of one orchard that shows the least indication of non-productiveness where the owners have given proper treatment.

The findings of the above men are indorsed by every member of our force.

In conclusion, let me say that I believe from the extensive data in my possession, the prevailing idea with many of navel orange deterioration is a purely chimerical notion without any evidence of fact, except when caused by neglect in some form. Every failure is a violation of one or more of the fundamental principles of latter day culture, and any person who may contemplate establishing an orange orchard as a business proposition need not fear if the enterprise is founded upon the concrete base of water, soil, and climate. Success also depends upon strict compliance with the five tenets of horticultural faith—irrigation, cultivation, pruning, fertilization, and fumigation. These strictly obeyed, there is no doubt of the salvation of the navel orange for the present and a long distance into the future.

PRESIDENT JEFFREY. I have just received a telegram from Prof. Wm. T. Horne of the University, stating that his train has been delayed, but that he hopes to arrive before the close of the convention.

MR. GLASCOCK. I think it only proper that we express to Professor Horne our regret that we can not wait to hear his paper. I make a motion to that effect.

The motion was duly seconded and carried.

MR. A. F. CALL. I move that this convention express by rising vote its appreciation of the manner in which this conference has been conducted by the State Commissioner of Horticulture.

After this vote had been taken the convention was again seated, and upon motion, duly seconded, the convention adjourned.

(As Professor Horne's and J. P. Engelhardt's addresses relate to a subject within the call of the convention, and both expected their papers to be read before the convention, they are here inserted within the body of the report.)

ROOT ROT OF CITRUS TREES.

By Wm. Titus Horne, University of California.

Under the name root rot of citrus trees I propose to discuss a specific disease from which citrus trees suffer in California. As a means of giving a clearer idea of its characteristics I shall refer briefly to some other citrus troubles in which the roots rot.

The roots of any tree may be killed by poisoning with various substances, such as illuminating gas escaping into the soil, excess of alkali, etc. Decay of the roots follows, but usually there will be nothing characteristic about it. Professor Hilgard* pointed out some time ago that an excess of lime in the soil might kill citrus trees, but the behavior of the roots is not described. I have seen during the past winter trees in bad condition, which, on examination, proved to have their lower roots rotted off. The soil a little below the surface was saturated with water, and apparently the death of the roots was a direct effect of the saturation. The condition of the soil has been improved and nearly all of the trees are promising to recover nicely.

Foot rot is probably the most widely distributed and destructive of all citrus troubles. In this disease decayed areas appear on the roots or the base of the trunk. The decay is of a peculiarly violent type, the roots affected being killed, and accumulations of gummy or nearly liquid material with an offensive odor being found below the bark. Fungous threads are often seen on decayed roots of this kind, but they are cobwebby and can not be seen to penetrate the decayed bark on examination without a microscope. In spite of the fact that foot rot is so old and serious a disease, no satisfactory study has been made of it. Professors Smith and Butler† have distinguished foot rot from gum disease, and given an excellent treatise on the latter. However, the same conditions bring about the two diseases and the same measures should be used in treating them. Incorrect water supply in the soil is the cause. Generally the trouble is a water-soaked subsoil. I do not know whether the bad effect is due to too much water or too little oxygen, or to some harmful development of soil bacteria. At any rate, it seems to be generally admitted that the most important remedial measures are to give a proper moisture content to the soil and good aeration. One of the first steps is to get the crown of the tree well exposed to the air.

I have seen in Cuba a type of root rot affecting the top as well as the roots. The whole tree or only a small part may show the trouble. During the hot weather of early summer one or two trees in fifty or a hundred acres would wilt suddenly and the leaves dry on the tree. The affected bark on trunk, limbs and root would be sour, and on the root would peel off in long, soft strips. The wood below the affected bark would be lightly stained to some depth. The part of the tree not affected would continue to grow thriftily.

The troubles I have just described are in one sense root rots—the roots rot—but they are not the root rot of which I wish to speak more particularly. They result directly or indirectly from the surrounding

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conditions. They are obscure, difficult to recognize, and mostly not well understood. The true root rot, however, is due to a definite parasitic fungus,* and when once known it is easy to recognize.

True root rot, known also as the toadstool disease or oak fungus disease, occurs on citrus trees in California and perhaps also on the citrus group in southern Europe.†

In California this same fungus attacks the roots of the various stone fruits, including almonds, and also olives and walnuts, and has been found on common live oaks‡ at Berkeley, and on the bay laurels.§ Our data, as to its distribution in the State, are incomplete, but it doubtless occurs rather frequently wherever there is or has been deciduous forest. What is without doubt the same fungus occurs rather commonly in various parts of the United States and appears to be attracting considerable attention as an enemy of fruit growing in various places. The same or a very similar fungus is one of the best known enemies of forest trees in southern Europe.

The disease is very quickly recognized both by its striking effect in the orchard and its characteristic appearance on close examination. The affected areas in an orchard are usually small at first, one or two trees, perhaps, being all that are affected in the first year. The following year one or two adjacent trees may become affected, and so on from year to year. Sometimes an affected tree may live through several years, but usually the tree dies rather soon after the top shows the first symptoms. Sometimes a tree is found with the whole root system killed and most of it in an advanced stage of decay, and the top scarcely showing any sign of injury. This is possible because the dead roots when surrounded with abundant moisture continue to keep up the water supply for the top for some time. In this case it is not long until the top will die suddenly. The seriousness of the disease depends upon its continuance in the same place. Histories of these affected areas over many years are difficult to get, but we have no reason to suppose that the disease dies out of itself while trees are being grown on the land. As to how long the fungus will live in the soil is largely a matter of conjecture. Young trees planted in these areas usually become affected before reaching maturity, so that they are practically a complete loss. The fungus lives not in the soil itself, but in the dead roots in the soil. So far as I know, no reproductive body capable of lying dormant for long periods is formed. It is reasonable to suppose that when the roots are completely rotted the fungus will have no more food and in time will die.

The appearance of the fungus is very striking, and it assumes several easily recognizable forms. In the first place, in digging down beside an affected root, numerous black strands will be seen lying against the root or running out for a few inches into the soil. These strands very much resemble small roots, but, on close examination, it is seen that they do not branch in the same way as tree roots. They are about the size of the lead in a common lead pencil, or a little smaller, and are more or less crooked or wavy, forking sometimes. If they are broken open they

* *Armillaria mellea* (Vahl) Quél. Mycologia, Vol. I, No. 2, p. 2, Pl. I, fig. 2, is apparently identical with or nearly related to this fungus.

† *Agaricus* (*Armillaria*) *citri* Inzenga, O Penzig, Studi botanica sugli agrumi, p. 308 and Pl. XXII, fig. 2, is said to occur on decaying lemon roots in Cicily. It is doubtful if this is the same as the California fungus.

‡ *Quercus agrifolia* Neé.

§ *Umbellularia californica* Nutt.

appear to be hollow, with a small amount of whitish material inside. Where one of these strands comes in contact with a healthy root, it becomes attached to the bark and sends out a whitish fungus growth, which penetrates into the soft part of the bark and sets up a very rapid decay.

The appearance of the outside of the affected root is characteristic as well as the inside. If the strand has been in contact with the bark only a short time, nothing will be seen except a blackish stain spreading out from the strand; at this stage the soil separates easily from the bark as in the healthy root. Where the disease is more advanced, however, the affected bark is considerably swollen and is so soft that it can be broken easily. The soil does not separate easily from the bark in this stage, and, even after a careful washing, more or less remains clinging to the surface. Doubtless there is an exudation of some gummy material which hardens on the outside and holds the soil particles. When the bark is torn off it is found to be thoroughly softened, and it may be separated off so as to expose fan-shaped pieces of felty white fungus, which may be an inch or more in length and nearly as wide. When the line between the healthy and the diseased bark is examined carefully, it is seen that these white, felty, fan-shaped pieces of fungus are pushing their way into the sound bark, but that they are always preceded by a watery and somewhat brownish decay, which causes the bark to soften and form clefts or pockets into which the fungus can spread. The odor of this decay, when it is new, is not at all putrid, but is an earthy, sharp, almost agreeable smell of fresh mushrooms.

During the wet weather of early winter, when badly affected roots are examined, the bark will be seen to be rather prominently raised in irregular ridges. Some points in these ridges become very much thickened and give rise to clusters of large brownish toadstools. A dozen or more toadstools, six to ten inches high, and each one three to five inches broad, may grow up from a thickening not much more than an inch long and three quarters of an inch broad. These toadstools are grayish brown on top and smooth, but showing fine dark brown scales which are small tufts of appressed fibers. They are nearly white below. Objects immediately beneath them are frequently seen to be covered with a fine white powder. This powder is made up of enormous numbers of minute spores. We have germinated these spores in the laboratory and have succeeded in reproducing the fungus, although only a part of the spores grew in our experiments. In nature it must be exceedingly rare that one of these spores succeeds in becoming established in a new situation; otherwise there would be no foot of soil left in the State which was not infected with this disease. Recommendations for its treatment usually include the immediate destruction of all these toadstools before they have produced their spores, and this is doubtless a wise measure. A considerable number of moist days in succession is needed to bring out the toadstools, so that in some sections they might never be formed, even though the disease was present.

There are a great many different species of toadstools which appear in the moist winter weather in California, but so far as we know, this is the only common one which is an active parasite. There will not be much difficulty in distinguishing the toadstool which causes root rot after once becoming acquainted with it. It can usually be recognized by digging down and finding its work upon the roots of some tree.

Those who wish may use it for food. It is not the best in quality, however, and is sometimes too bitter to be edible.

In addition to being a powerful parasite, this fungus is also a vigorous wood destroyer. Where some of the roots of a tree are affected, it will be found that the deeper roots are more completely rotted than the upper ones, and, if there is an abundance of moisture, the lowest will be found in a condition as soft as new bread and saturated with water. In all wood in which we have observed its effects, it produces a white rot, the surface exposed to the air being covered with a dark brown membrane; some wavy brown lines are also formed in the wood. Where it destroys thick bark, like that of the oak, a material is formed very much suggesting soft-cooked white or yellow cornmeal, with the surface covered with a brown membrane and numerous wavy brown lines in the decaying bark. It will be noticed that this fungus works from the outside inward; the outer layers of bark are affected usually before the inner. This distinguishes it very sharply from the various heart rot fungi.

Various remedial measures for this disease have been suggested, but there is still considerable difference of opinion concerning them. The European remedy is to dig a ditch around the affected area and thus prevent the spread of the fungus, but California orchardists object to cultivating and irrigating across a ditch. We have observed that the fungus seems to have very little power of spreading in soil which is moderately dry. Possibly it may be controlled to some degree by keeping the soil from becoming too wet. The grubbing out of all affected trees and of those at the edges of the diseased spot has been recommended; it is not sure that it will be possible to dig out and remove from the soil all of the roots so that the fungus will not still be able to spread slowly from one root to another, and continue the infection in the soil as well as continuing to enlarge the affected area; yet the removal of affected roots from the soil would seem to give the new planting a better chance, even though the danger can not be entirely avoided in this way. Trees planted in affected areas frequently live for a good many years, but it is possible that even the best of them will succumb in time. Where no attempt has been made to remove the diseased roots, we have found the roots of the newly planted tree well infected within about half a year. It has been recommended to use large quantities of disinfectant in the holes where the affected trees were dug out, but the results of this treatment do not seem to have been observed sufficiently, and it seems very improbable that it can be entirely depended upon.

It has been suggested that probably there are some root stocks which will be immune or resistant to this fungus. We are planting the various citrus roots in these diseased spots with the hope of determining this point. It is said that the pear is resistant. With the stone fruits it is usually so difficult to tell with certainty what stock has been used that it does not seem possible yet to say definitely whether any stock is immune. I do not yet have authentic data to show that the black walnut root suffers, but it probably does. I do not know that figs are affected.

As you see, the amount of definite knowledge which we possess concerning this trouble is very small, and one of the principal objects of presenting the matter to you is to request that you furnish data to the

University, wherever it may be collected, to assist us in this study. The things we desire to know accurately are:

First—What kind of tree is affected? And in this matter it is the root we desire to know about, rather than the top.

Second—What kind of soil does the disease occur in, and is there anything to be noticed in connection with the drainage?

Third—How long has the affected area been developing, and what was the previous history of the ground? If trees have been replanted where others have died, what has been the history of the replants? Does the disease spread downhill more than uphill, and does it spread along irrigation ditches or across them?

Fourth—Have any remedial measures been tried, and, if so, what, and the results?

In order to make sure that no mistake has been made in recognizing the trouble, it will be well to send specimens of the roots to the Department of Plant Pathology, University of California, Berkeley. The specimens should be of good size; that is, it will be well to send several roots, making a package of a pound or more, and these should be carefully wrapped so that they will arrive with as little drying as possible. Specimens may be sent either by mail or express.

It will usually be impractical to send the toadstools in the fresh condition, because they decay very rapidly in a closed box. However, they can be dried very easily by placing specimens which are still firm and in good condition in a draft of warm, dry air. Care must be taken, however, not to get them too hot. Dried specimens are fragile, but in a strong box they can be sent safely, and, if not overheated in drying, can be recognized perfectly.

While this trouble is not a new one, and is not liable to increase suddenly, it is still of sufficient importance to merit very careful study, because we have as yet no satisfactory remedy for it, and it is gradually increasing.

THE PRUNING OF THE WASHINGTON NAVEL TREE.

By JOHN P. ENGELHARDT, Glendora.

JONES: "Neighbor, why are my oranges not as good as yours? I spend as much money for fertilizers as you do, I irrigate just as carefully, and plow and cultivate just as you do. I raise cover crops, too; but my fruit is inferior to yours."

SMITH: "I'll tell you what, Jones, you don't prune enough. You don't cut out the water sprouts and the foreign wood, that is, wood that is not true Washington navel. All your fertilizers, all your irrigating water, all your labor of cultivating and of growing cover crops, is thrown away if you haven't the right kind of wood for your orange-bearing branches."

JONES: "How can I tell the right kind of wood?"

SMITH: "Well, the best way to begin is with the water sprouts, or 'sucker' growths, as they are commonly called. They bear poor, coarse fruit, and that only at their ends or tips. This makes these branches bend down and crowd the fruit below, thus shutting out light and air from otherwise good fruit below them. After the winter rains, and usually after irrigating, you will find many of these young shoots

which sap the tree. It is most important to remove these as soon as they form."

JONES: "I thought one pruning a year was enough, and was just going to ask you the best time of the year to prune."

SMITH: "Friend, that way of doing is all out of date. It is economy to cut out sucker or water sprouts, after every two or three irrigations."

JONES: "Why?"

SMITH: "Because the first thing you know these young shoots rapidly help themselves to a great deal of the sap containing rich ingredients such as nitrate of soda, and what do they give you in return? Wood and more wood; but oranges? none, at least not many, and the fruit that is formed is coarse and tasteless. The more fertilizer you give an unpruned tree, the worse the fruit will be. If you haven't time to prune it is better not to fertilize the tree. The time is at hand when oranges will be graded according to their taste as well as their looks. Do you think we should have so many unexplained so-called 'slumps' in the Eastern orange markets if we really furnished a good orange?"

JONES: "Does the water sprout continue to form inferior wood?"

SMITH: "Yes, the second season fine luxuriant branches form from them, but not fruit-bearing, and mostly wood-bearing. If you take buds from this stock for propagating you produce a very poor nonbearing tree. In fact, to propagate from such stock is slow death to our grand orange industry. What is more, the older these sprouts get, the more they weaken and rob the tree in order to form still more wood. Some people permit these branches to grow wood for ten years, and wonder continually at their meager bank account."

JONES: "Well, Smith, suppose I cut out the sucker growths as soon as formed, shall I get fancy fruit and plenty of it?"

SMITH: "No, not always. Unfortunately, the trees sold us by the nurserymen are not always from good stock. The buds from water sprouts look so fine that some of our so-called 'best budders' use them for propagating, instead of taking buds from pure fruit-growing branches.

If you go from orchard to orchard you will find from twenty to twenty-five per cent more wood than is necessary to produce the same amount of oranges. I honestly believe, Jones, that by pruning properly you can save from twenty to twenty-five per cent of your expenses, besides improving the quality of the fruit raised by ten per cent.

It is necessary to cut out all foreign wood and reduce the tree to the original Washington navel. Did you notice that Riverside man who called here? He declared that the Riverside navel orange is deteriorating, and that he can prove it, too. As for myself, I can say that the Glendora orange of to-day is not as good as it was twenty years ago. This deterioration has been observed for fifteen years and is becoming alarming. I attribute it to lack of pruning largely.

One can soon learn to tell the different kinds of foreign or untrue wood by the shape and looks of the branches. One easily learns what shape to expect from certain kinds of foreign wood. Few ranchers, and even pruners, seem to understand this. By 'pruning' they seem to mean the well balanced shaping of the tree. Some haven't even this idea; but mean by 'pruning' a general lopping off of branches by the 'hit or miss method.' If this thing goes on, the navel orange will

eventually run into culls, and instead of being 'orange growers' we shall be 'cull growers.'

Let me tell you, Jones, a small packing house near by sold twenty-seven car loads of culls to a certain Italian last winter. Besides this, he rejected ten more cars as being too inferior for his trade even."

JONES: "I can not quite accept your statements."

SMITH: "Go to our packing houses, Jones, and look over the fruit as it comes in. Go out into the orchards as they pick the fruit and notice how many different shapes and sizes and colors you will find. For instance, certain kinds of branches furnish pear-shaped oranges.

Oh, shade of the original Washington navel orange, if you should perchance hover over our beautiful southern California, what queer shapes and monstrous forms you would find masquerading under your magic name.

When we learn of 'slumps' in the orange market it frequently means that we have shipped a mass of inferior fruit, or fruit that is not true to name, and that the public can not be induced to buy. How often we find fault with the managers of our associations, or the packing houses, when the fault is ours in not furnishing fruit of pure, good stock. In fact, there are from three to four kinds of worthless wood growing in our fine orange trees. This must be removed, even if it takes half the tree."

JONES: "Why is it that we have such extremely large and extremely small fruit on the same tree occasionally?"

SMITH: "The tree is not well balanced, some of the wood is too thick and rank."

JONES: "Do you think the old Australian navel tree can be properly rebudded and made to bear fine fruit?"

SMITH: "I have had a budder try three times and he failed each time. His buds were at fault. He insisted on taking them from water sprouts. However, I budded sixteen trees myself with good stock and succeeded in each case."

JONES: "What can we growers do to remedy this state of affairs. It is not possible at the present time to secure skilled help on the ranch; we must educate help."

SMITH: "I believe that we ought to have scientific pruners, men who have studied 'pruning' at an experiment station under Government control. The United States Government is helping the corn and wheat growers of the Middle West by furnishing them with selected seeds, and is educating them by means of 'Farmers' demonstration trains.' The Government will do as much for the orange grower if he desires it. Isn't our orange industry worth as much as the corn and wheat industry?

Glendora ought to have an experiment station. We could teach pruning and would only allow men with certificates to prune.

The San Dimas Lemon Association claims that it saves the growers much money by having the picking done in accordance with suggestions from the Department of Agriculture. Surely to have our pruning done under the same supervising help would benefit our industry.

Unless something is done soon, the next generation will 'run out' the Washington navel tree and grow instead the 'cull' variety. My motto is, 'Pure Wood makes Good Fruit.'

In spite of all care in budding and pruning, we may still not make great headway in getting fancy fruit, owing to the original seed from which the stock was grown. Fancy seed corn in Kansas sold at the rate of $2,000 a bushel this summer. Do we ever investigate our seed for stock? Then, too, Kansas seed produces annual plants, but orange seed produces trees that live a lifetime, good or bad. One mongrel seedling or old lemon tree of poor quality may do thousands of dollars of damage. Another thing I have noticed, friend, is that we are trying to build up large full-bearing trees on an inferior root system. The demand for nourishment is thus greater than the supply, especially since the trees are only twenty feet apart. We must, in that case, reduce the tree above ground by vigorous pruning."

ALTERNATIVE PAPERS.

The following papers were prepared at the request of the Commissioner to be read before the convention in case all the time was not taken in the consideration of topics named in the convention call. As the meeting progressed, it was discovered that the two-days' session provided for was not adequate for the work outlined in the regular program. Hence these alternative subjects were not discussed or the papers read at the convention. The article upon curing and coloring fruit was prepared at the request of a Pomona fruit grower.—J. W. J.

IMPROVING THE ORANGE BY SELECTION.

By Caroll B. Smith, Redlands.

We have accepted the Mediterranean, Florida, and Brazilian types of oranges and lemons as they came to us without questioning the possibility of their further improvement. When introduced they grew easily and splendidly, and at first free from pest or disease. It was natural, therefore, that as the acreage increased, and when the marketing began, all efforts should be turned toward production, that is, toward quantity rather than quality.

The earlier planting was on lower ground, where water would flow easiest. Generally speaking, the soils in such places were too heavy and the situation too cold. Later, the ditches were laid higher and tapped the streams higher up the canyons, so that water was conveyed to the elevated, well drained mesas where, under more perfect conditions, production multiplied rapidly. The quality and surety of the crop was here all that could be desired. The first improvement of citrus fruits was thus along the line of congenial environment.

The fact that no species of plant life is "fixed" is now attracting general attention. No two plants are exactly alike. The variations enable plants to adjust themselves to external conditions.

It is a far cry from the wild seedling to the present type of orange, with its thousand variations between. It is easy to believe that if the orange thrives so easily with us, its present type is superior in some respects to the type of its first less congenial environment. For

example, they say the Washington navel is not so regular a bearer in Florida as it is in California.

Apples, tobacco, cotton, corn, sugar beets, potatoes and many other products have been improved by "selection." Crossing by pollination has been a factor in most of these, but the navel orange having no pollen can not be used to cross another variety. How, then, can it be improved? If you pollinate a navel orange blossom with pollen from a grape fruit or seedling orange its fruit will bear seed, and this characteristic if established would not be desirable. Nevertheless, observation and attempts at "selection" have already gone far enough to show positively that the navel orange of itself, apparently without any external influence, or any known cause, does vary decidedly. Instances are known where single branches on trees have shown distinct variations for four or five successive years, while the balance of the same tree averaged with the rest of the orchard. The Thompson Improved is a well known illustration. Of course, if one works with seed-bearing varieties he has the additional aid of crossing by pollination. This breaks up "fixed" or hereditary habits, which may or may not be perpetuated in the progeny.

In a whole field of Marguerites perhaps only one gave any promise of the "Shasta Daisy." But that one "selected" or propagated tended to yield less of the original type and more of the new desired. It may require many generations, but eventually any new type can be quite well established.

Difference in the quality and prolixity of groves is commonly recognized to-day. Any real estate dealer can show you groves of exceptional reputation for large yield. Ask any packing house manager whose fruit graded the most fancy in his house, and he can at once point you to several whose average of fancy was higher and whose culls were less. These are not necessarily cases of soil or culture, though they may be in some instances.

I know of an orchard where the foreman has been familiar with every tree for nine years, and he can point you to five or six trees that will average a better quality and appearance than any other six in same orchard; and of these six two have never in nine years failed to yield from twelve to fifteen field boxes of navels. Some may miss a year now and then, others may often miss, but the regularity of the two mentioned is evidently exceptional and worthy of propagation as a possible improvement. Whether the progeny will come true to the original stock remains to be seen. If we could establish some pedigree system of taking the yield of every tree each season, I have no doubt we would soon improve in any desired direction.

I know of a small orchard the fruit of which will ripen every year about November 1st. The fruit is almost seedless, good color, and sweet to taste. The stock was obtained twelve years ago from a chance seedling that bloomed early in its nursery life. The owner marked it and propagated it as a curiosity, with the result that to-day he can guarantee ripe, sweet oranges for Thanksgiving every year.

There is the question of sugar content. I believe this could be increased if only we go after it with some system. This involves suitable laboratory equipment and expert assistance and takes time—yes, years. But the work and system should be inaugurated now, if possible, with the present maturing crop.

The question of outside appearance is essential to good selling quality. Thin skin, rich color, high sugar content, full juice, and a good carrying quality should be looked for in the navel orange. We also want a Valencia that won't turn green a second time. A lemon as highly acid as possible. A grape fruit that bears desirable sizes and does not have an off year, and other citrus varieties too numerous to mention.

Prof. Ralph Smith of the Whittier Station knows of a navel tree whose fruit ripens months later than is usual. A late navel, even if it had no better qualities than the present type, would lengthen the shipping period.

This subject of improvement by "selection" should be agitated, and observation encouraged along suggested lines. You may pass the improved orange daily and not know it.

Professors Coit of the Whittier Station and Norton of the Riverside Station, or the writer, would be glad to receive notice of any promising variations. Mr. Shammel, also of the Department at Washington, is now with us with the express purpose of improving the orange by selection. We can all try to assist in this work by noting desirable variations and reporting the same.

What would be the effect on the demand for our fruit if we could constantly improve its quality, size, or appearance?

To use the words of Luther Burbank: "The vast possibilities of plant breeding can hardly be estimated. It would not be difficult for one man to breed a new rye, wheat, barley, oats, or rice which would produce one grain more to each head, or a corn which would produce an extra kernel to each ear, a potato to each plant, or an apple, plum, orange or nut to each tree.

"What would be the result? In five staples only in the United States alone the inexhaustible forces of nature would produce annually, without effort and without cost,

5,200,000 extra bushels of corn.
15,000,000 extra bushels of wheat.
20,000,000 extra bushels of oats.
1,500,000 extra bushels of barley.
21,000,000 extra bushels of potatoes."

INSECT CONTROL.

By Prof. A. J. Cook, Claremont.

The subject of scale insects and their control is one whose importance to the citrus industry, and to the perpetuity of the citrus orchards, can hardly be exaggerated. Else one of our most competent orchardists would not have paid out more than $25,000, in a single year, in fighting these pests; else hundreds of thousands of dollars would not be expended annually to subdue or eradicate these scale insects.

I assert positively and confidently the truth of the following propositions, in the light of actual experience: (1) Scale insects can be controlled at an expense, not at all prohibitive; (2) Fumigation, especially in the orange orchard, is the only sure specific against most of these scale pests yet discovered; (3) Fumigation rightly managed need not be repeated oftener than once in two or three, I believe four years; (4) As practiced, fumigation is often very inefficient. Orchardists bid for

cheap work, too cheap to be effective, contractors whittle dosage below the killing point, and guesswork completes the mischief; (5) Despite the large annual expense in fighting scale, the loss from infestation, through injury to fruit and depletion of vigor of trees, is frightfully great, and the increase of scale infested territory is certainly alarming; (6) Near the ocean, especially, irregular hatching of the black scale results in the presence of the insect in all stages of growth, from egg to mature scale, at all times and seasons of the year, and so the problem is even more complicated, and may make a double fumigation, in quick succession, wise and necessary—in any case, the motto must be "Clean fruit and clean trees always"; (7) We must have horticultural commissioners, thoroughly taught in entomology, with the energy and vigor of youth, who will be quick of observation, and who will insist that all orchards be kept clean; they must be fired with ambition and love of the work; such are not born of politics. Our law must be amended so as to give but one commissioner, with the single qualification of knowledge and fitness; (8) Our orchardists must be convinced that no greater asset can be secured than the fact and reputation that our region is scale free. Like the King of Babylon, our old methods, or lack of method, is "Weighed in the balance and found wanting." True, much good has been wrought, enough to demonstrate magnificent possibilities. A great dose of inefficiency, all these years, has cost the growers millions of dollars, and calls loudly for a better way. One orchardist near here paid a year ago to have his grove fumigated the sum of $12.00, and now the orchard is black with smut. Such examples are not lonesome from lack of companionship. Our growers know that a better method is imperative and so the exchanges in this section,—Pomona, Claremont, San Dimas,—have inaugurated what must be a tremendous improvement all along the line.

The Southern California Fruit Exchange has been rightly called the savior of the citrus industry. Its work to develop the markets for our fruit has been as successful as it has been colossal. Its influence secured to us the greatly needed advance in the lemon tariff; so says Senator Flint. Its work in securing cheaper supplies and in inducing better methods of handling is worthy all praise. It is hard to say which should most exalt our pride, our magnificent citrus orchards, or our phenomenal coöperative organization—the Southern California Fruit Exchange. The exchange has still a further mission, which it recognizes, and hastens to fulfill. This is nothing less than the solution of this question of "Insect Control."

Fumigation is night work; mistakes in dosage, and even omissions are easy to make. Yet absolute thoroughness, and entire absence of mistakes are imperative. To secure all this *always* and *every time*, requires managers who are full of energy, whose interests are all enlisted, whose faculties are all awake. To have a business of such importance and magnitude where mistakes are so frightfully expensive, in charge of irresponsible parties—the lowest bidders—is as unbusinesslike as it is ruinous to the fruit and orchards. The exchange can secure the right man, whose every interest will be awake, who can force efficiency, and thus save immensely to our citrus growers. With the Morrel system, guesswork will be banished; with this wiser management, mistakes will be reduced to the minimum, and we have only to adopt the "block

system" to complete the grand round of improvement, which must be a godsend, indeed, to our growers and to our section.

The manager must be a keen observer, fully equipped with information, of great energy, and of great executive force and ability. Such competence always commands good pay, and we must follow the lead of all great business firms, and pay liberally for this service. Our manager must dream of his work, in his overmastering desire that it shall win out. He must have carte blanche to secure and maintain the very best of tents, to use an ample dosage, and to have efficient and enough help to push the work to the utmost.

Again, each grower should be willing to sacrifice individual interest to the general good, that the manager may have entire support as to times and seasons. He will heed wind and variety of scale, and plan that the work will not need to be oft repeated. Thus, in the end all gain immensely.

Sicily, if she has older and more vigorous orchards than we, may rightly charge it up to her scale free trees. No doubt but protected fruit will stand up longer and better in the marketing.

This section is to be congratulated on the enterprise that has inaugurated this splendid reform. We believe that she will carry it on to a convincing success; that soon all southern California will swing into line, so that our orchards will be as matchless in their freedom from insect despoliation as is our scenery in its grandeur, or our climate in its agreeableness and salubrity.

THE COLORING OF LEMONS AND ORANGES BY OUR SWEATING PROCESS.

By L. B. Williams, Whittier.

Having been drafted by our Honorable Commissioner of Horticulture to write a paper for this convention, entitled "The Coloring of Oranges and Lemons by the Sweating Process," and realizing the various ways and conditions by which oranges and lemons can be colored, and that there are no ironclad rules that can be laid down at the present time. I asked for the privilege of inserting in the title the word "our" instead of "the" and was kindly granted the changing of the title to "The Coloring of Oranges and Lemons by Our Sweating Process," thus allowing me to tell our experiences in a plain, simple way, giving a brief outline from our first experiments up to the present time. It is necessary to begin at the beginning in order to clear the points I wish to make. Our first sweat room consisted of a small room, single wall paper lined, large enough to accommodate one car of fruit at a time. This room was in the main building; in fact, it constituted the largest per cent of the main building at that time. The fruit was washed and placed in our picking boxes and trucked into this room, stacked ten boxes high, papering the top box.

When the room was filled, or nearly so, it was heated with kerosene stoves. The first stove was the kerosene drip stove; next we used the "Perfection B," also Perfection No. 813B, which is the same stove as far as the writer can see. The temperature of the room was held at ninety degrees as near as possible, this being the maximum. The temperature was regulated by the number of burners in the room. It was

necessary to keep the fruit moist to keep it from wilting. This was done from evaporation by placing a vessel on the stove and filling it with water, the amount of moisture depending upon the number of burners required for the temperature, so the moisture at this time automatically adjusted itself.

If we wished the fruit colored quickly, this process would continue day and night. Our pickings increased until it was necessary to have more sweating accommodations. Not being satisfied with all conditions, and believing that improvement was soon at hand, we decided not to build just then, so we moved out into our regular storing tents, using the kerosene stoves for heat in the same way, only more of them were required, considering temperature only.

Having more room and fruit, it was necessary to have more stoves. The old Perfection B had had its day and the new Perfection taken its place, consequently we purchased new Perfection. We soon discovered the new stove did not color the fruit. It gave off the same amount of heat, also evaporated the same amount of water, was much nicer to manipulate, but decidedly slower to color. Very often we were required to make a change, taking out the new stoves and replacing them with the old in order to complete the job. The old stoves threw off a large volume of pungent gas. This being the only difference we could see, led us to believe that there was some virtue in the pungent gas. We also discovered we could shorten the time of coloring in tents by making them two thicknesses, placing one over the other, thus more closely confining this pungent gas.

We carried on a few small experiments at this time which served to strengthen our opinion that this pungent gas was an important factor in coloring oranges and lemons.

While sweating in the room and tents, the stoves were on the same floor with the fruit. This had several objectionable features, namely, the fruit would not color in the bottom box as soon as in the top. They had to be turned out and removed every time we trucked fruit out. This was dangerous, as the stoves were liable to be struck with the trucks, causing leaks or fire.

Feeling the need of better accommodations and having in mind all the points we had picked up from past experience, both good and bad, we planned to build a new sweat house, one that would cover all the good points and overcome the objectionable ones. We also decided to build as nearly fireproof as possible, independent of the main building, and thus eliminate the danger of fire, especially to the main building. We at this time had the good fortune of having an assistant to help plan and build such a sweat house, this party having had successful experience in firing from the basement. The basement idea would overcome the objectionable feature of having the stoves on the same floor.

Pardon me just here and allow me to deviate slightly from the subject, and I will give a brief description of the sweat house. We first staked out a piece of ground 42 feet by 46 feet, inside measurement, being sufficient for six rooms 14 by 20. We excavated for each room, making a basement 12 feet by 18 feet at top, allowing it to taper at about 45 degrees, 6 feet in depth, which gave us 5 feet by 8 feet 6 inches at the bottom for stove floor. The tapering wall prevented it from crumbling and gave sufficient strength to carry foundation and partition walls. We excavated an aisle 4 feet 6 inches, tapering to 3

feet at the bottom and running lengthways of the building. There are three rooms on each side of the aisle, with doors entering from the aisle, which enables us to go into the several rooms independent of each other.

Water is piped to each room. There is electric wiring in conduit throughout the building. Also allow me to mention, in passing, that two fire escapes have been wisely provided, in addition to the main stairway, making a total of three possible ways for a man to escape in case of fire.

Now we come to the upper rooms. The main outside walls are of concrete, 6 inches thick, 8 feet high, with a small window in each room. The ceilings and partitions are of 1-inch tongue and groove redwood. A 6-foot aisle runs lengthways of the building, with doors the full width of the aisle at each end. There are three rooms 14 feet by 20 feet on each side of the aisle, each room independent of the other. The floor is made of 2 by 6 Oregon pine, laid with ½-inch openings between each, affording ample room for the heat and gas to come through. The gables are ceiled with 1-inch rough Oregon pine, covered on the outside with sheet iron. There are three doors in each gable, which allow a large per cent of natural heat to escape. They are so arranged that by pulling a small cable in or out of sweat house they can be unlatched, closed and latched. This was provided so that in case of fire they can be quickly shut, which would protect the sweat house from any outside fire. In case of the fire starting in the sweat house, this would confine it to same and protect the outside buildings. The roof is of galvanized sheet iron, with vent in top. This vent can also be closed by pulling a small cable.

There is a 5-foot by 8-foot galvanized sheet iron secured to the upper and under the main floor over the burners in the basement to prevent flames or the heat coming direct on the fruit, in case we are not using vessels on the stoves.

Now, back to the coloring of the fruit. Here I will speak of the oranges and lemons separately, as we find we have better results treating them differently. I will speak of the oranges first. The green and yellow are separated at the washer, placed in packing cases stacked eight high, the fruit in the top case being covered with paper. The fruit is then trucked into the sweat room, trucking the dark green in first and placing it farthest from the door. The rooms being 14 by 20 affords ample room for one car or 600 packing cases to each room. The boxes stacked eight high prevents restacking in the sweat room. The fruit is trucked 5 rows in each room, 120 boxes to a row, and 5 inches space between each row, thus allowing room for the removal of the clamp trucks. The fruit is set in with a small space left between each stack, say 1 to 1½-inch, which is ample room for the heat and gas to equally distribute itself. Having the stoves down in the basement makes it possible to truck fruit in and out of sweat room without disturbing same. They are low enough to afford uniform coloring top and bottom, holding the temperature of the room at about 100 degrees as near as possible, 100 degrees being the maximum. Moisture is used sparingly. We have not been able to secure a hygrometer that will give us sufficient accuracy in the sweat room to be able to establish a fixed humidity, so we are compelled to go by observation. We supply our moisture from evaporation, using just enough to keep the fruit from wilting, and watching that there are no beads of water collecting on

the fruit or ceiling, working for reddish orange color. The color is improved by quick action, firing continually until well colored.

Now, the sweating of lemons. You will note the difference in temperature, humidity, and time allowed to color. If the sweat room has stood with long intervals between usage, we go into the room thoroughly wetting the walls, ceiling, and floor before we allow any fruit to go in. First, washing the fruit, we divide the green fruit into three or more shades: Dark green, light dark green, dark light green, and light green. We think it is imposible to put too much care upon this important position at the washer, consequently we see that there is a competent hand at this place. If this classifying is well done the fruit can be handled in such a way as to receive the best results from the room.

I might say here that at this time of year, or when we are getting a per cent of the new crop and a small per cent of the heavy dark green is rough and coarse, if it is stored elsewhere for about ten days or two weeks before going into the sweat, it will improve both in color and quality.

The lemons are trucked into sweat room from washer, trucking in the dark shades first, lighter shades next, and working the lighter shades to the door as the light green colors should come out first, thus allowing the fruit to be uniformly colored. We find a difference of twelve to twenty-four hours in the time required to color the different shades. In firing from the basement we endeavor to produce all the gas we can, paying close attention to the temperature and holding it as nearly as possible to ninety degrees, this being the maximum. Lemons require much more moisture than oranges, and should have a sufficient amount to prevent not only wilting but to prevent the heat from baking the color to a ripish or dark yellow. In lemons we work at all times for a whitish yellow. The humidity can vary to quite an extent before there is too much, but I am unable to say just what per cent. But to speak again from observation, there must be beads collecting on the ceiling and fruit. This moisture is supplied by evaporation. Occasionally we have a room of fruit that drinks up all the moisture we can supply by previous sprinkling and evaporation. When this condition presents itself we attach the hose to the hydrants in the basement and wet the fruit down, soaking everything in the room. We also go down in the basement and sprinkle the walls heavily.

A much better color is secured if more time is given to the sweating, say firing at intervals instead of firing continually.

We have carried on various experiments, working with hopes that we could discover a way by which lemons could be quickly colored and retain their buttons. Results of our work so far have proved that this combination can not be accomplished, but can be done separately. The buttons will not drop off if much more than the ordinary time is given to color. Our experiments served to strengthen our conclusion that the pungent gas was the prime factor in coloring the fruit, also was the whole factor in throwing the buttons, while, as I have said, if a small quantity of gas is put to the fruit it will color it in time and not throw all the buttons, but a large volume of gas will hasten the color but throw the buttons, very often before the fruit commences to color.

About the fall of 1908 Prof. R. H. True, assisted by A. F. Siever from the Government Bureau of Plant Industry, came here and took

up the work assigned under their industry. Shortly Professor True was called elsewhere. Mr. Siever carried on various experiments, testing the life of a sweated lemon as compared with natural cured; also making chemical analysis of the lemon, which came out in Circular No. 26, issued May 26, 1909.

He, working in conjunction with ourselves, carried on various experiments, again proving in all experiments that the gas was the prime factor in coloring fruit.

It will be the pleasure of the Bureau of Plant Industry to hand out a circular giving the particulars of all experiments and results carried on during two seasons while here. This will be done in time. I wish to say that we carried on sufficient experiments to place us in a position where we could see that we were in a large field—room for difference of opinion under the same conditions. The cause underlying this great difference is not fully understood at present, but the results of the experiments so far invite a more interesting study of the sweat room.

In closing I will say that I believe the time is near at hand when we will be able to generate our gases for a large amount of fruit from a small amount of fuel, thus reducing the cost of labor, cost of fuel, and last, but not least, reduce the great danger of loss by fire.

EIGHTH BIENNIAL REPORT

OF THE

STATE DAIRY BUREAU

TO THE

GOVERNOR OF THE STATE OF CALIFORNIA

1909-1910



SACRAMENTO:
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1911

THE STATE DAIRY BUREAU.

OFFICE: 16 California Street, San Francisco.

M. T. FREITAS, *Chairman*_____San Rafael.

E. P. NISSEN_____Ferndale.

J. R. MURPHY_____Fresno.

F. W. ANDREASEN, Secretary, Berkeley.

CHESTER F. HOYT, Chemist, Berkeley.

REGULAR INSPECTORS.

J. L. STARR, Los Angeles.

W. H. PERROTT, Loleta.

E. H. SHERMAN, El Centro.

J. A. BUTLER, San Rafael.

J. S. CANHAM, Fresno.

A. B. DEBORBA, Novato.

San Francisco, December 1, 1910.

To His Excellency James N. Gillett,

Governor of the State of California.

Sir: In compliance with the requirements of an act of the legislature, approved March 4, 1897, and an act approved March 20, 1905, we have the honor to submit herewith the eighth report of the State Dairy Bureau for the two years ending December 1, 1910.

Respectfully,

M. T. FREITAS,

Chairman.

F. W. ANDREASEN,

Secretary.

EIGHTH BIENNIAL REPORT.

The last two years covered by the eighth biennial report of the State Dairy Bureau of California have been years of great prosperity to dairymen, and, as a consequence, great irrigation systems have been and are now being developed in Sacramento, San Joaquin, Imperial, and other valleys of the State. Much of the land is divided into small farms and prepared for alfalfa. Many of the small creameries have become skimming and receiving stations for large new plants built the last few years and equipped with the most modern machinery. This has in some localities reduced the cost of manufacturing and in most instances secured a better and more uniform quality.

It has been apparent to all who have watched the dairy industry that the growth in this State has been remarkable. If it was not for the difficulty dairymen find in securing the necessary help to do the milking of their herds the growth would have been still greater. In most all other industries, when it has become difficult to obtain necessary help, labor-saving machines have overcome the difficulty, but the milking machines do not seem to have done satisfactory work, except in occasional cases where they are handled by a very competent operator. It is hoped that these machines will be so perfected that they can be relied upon to do the work as well or better than it can be done by hand. There seems to be no danger of an overproduction of dairy products since the growth of population more than keeps pace with the growth of production, and at this time the demand far exceeds the production.

DUTIES OF THE BUREAU.

1. To prevent the unlawful sale of substitutes for butter and cheese in this State.

2. To enforce the law preventing the manufacture of cheese in the State unless the same is branded so as to advise the purchaser whether it is "full cream cheese," "half-skim cheese" or "skim cheese," and to register and issue state brands to producers of cheese.

3. To enforce the law preventing the sale of renovated butter unless the same is labeled as such, and to issue licenses to manufacturers and dealers in renovated butter, collect fees for the same, and pay them to the State Treasurer.

4. To enforce the law preventing the use of inaccurate testing apparatus in connection with the Babcock test or other means of determining

the butter fat in milk and cream, and to test apparatus used with the Babcock test for accuracy upon application, and certify to same.

5. To enforce the law preventing the sale of milk or milk products from diseased cows or from an unsanitary dairy or factory of dairy products.

6. To enforce the law preventing the use of chemical preservatives, thickening material, and coloring matter in milk and cream.

7. To enforce the law preventing the misbranding of butter as to the name of producer or place of production.

8. To gather statistics and other information relative to the dairy industry, and to disseminate the same.

9. To enforce the law prohibiting adulteration of dairy products.

OLEOMARGARINE.

For a number of years no considerable amount of oleomargarine had been used in this State, but of late a large number of firms dealing in oleomargarine in this and other states have been sending to this office for information and laws relating to the product. We have not found oleomargarine sold illegally.

It would greatly assist the State Dairy Bureau in enforcing the "oleomargarine and filled cheese law" if all persons, firms, or corporations who manufacture or sell oleomargarine or any imitation butter whatsoever, or other imitation dairy products, were required to keep a sale book in which all sales were entered at the time of sale, stating date and amount of sale, with name and address of purchaser and with a provision that such books should be open to inspection of a representative of the State Dairy Bureau.

A heavy license must be paid by parties in this State desiring to manufacture and sell renovated butter. It seems to be only fair and this Bureau will recommend that parties desiring to manufacture and sell oleomargarine should also be required to take out a license and pay a fee of $300.00 for a manufacturer's license, $200.00 for a wholesale or importer's license, and $50.00 for a retail license.

CHEESE.

Since the act was passed (March 4, 1897) requiring that all cheese manufactured in this State must be branded, the manufacture of other than full cream cheese has practically been abandoned. Since February 17, 1900, there has been no application for other than full cream cheese brands except in one instance.

The law provides that all cheese manufacturers in this State making cheese by the ordinary Cheddar process, must brand each cheese "California Full Cream Cheese." "California Half-Skim Cheese" or "California Skim Cheese," and a standard is fixed for the different brands

and no person can sell or offer for sale any cheese made in the State of California, not branded by an official brand and of the grade defined. But the law is silent as to cheese coming in from other states, which appears to be discrimination against California products.

This Bureau will recommend that all cheese factories in this State must, on the first day of October each year, cause their factory to be recorded by the State Dairy Bureau, and that owner or manager of said cheese factory be required to furnish to the State Dairy Bureau on or before November 1st of each year, upon blanks supplied by said Bureau, a full and accurate report of the amount of cheese or other dairy product manufactured during the year ending September 30th.

We further recommend that the present cheese grading law be amended so that all cheese sold, exposed for sale, or on hand for sale, not plainly marked as to its quality must contain in the water-free substance not less than fifty per cent of milk fat, or if marked "half-skim" must contain in the water-free substance not less than twenty-five per cent of milk fat.

The enforcement of the sanitary dairy law is the most important duty intrusted to the Bureau. Before the beginning of the first seven months covered by this report the appropriation had been nearly exhausted. July 1, 1910, when the last appropriation became available, the inspectors who had previously been employed by the Bureau, and had not engaged in other occupations took up the work again and others were employed as they could be found. Mr. J. L. Starr inspected dairies and factories and looked after the milk supply in Los Angeles, Riverside, Ventura, Orange, San Luis Obispo, Santa Barbara, and other counties. To do that work thoroughly in those counties at least three inspectors should have been employed, but by working a month in one county and then unexpectedly turning up in another county working a while there, he has accomplished a great deal in the way of sanitary improvements.

Mr. J. H. Severin's work was devoted almost exclusively to improving the sanitary conditions of dairies and factories in Alameda, Contra Costa, Solano, Yolo, Sacramento, Sonoma, San Mateo, Santa Clara, San Joaquin, Merced, Stanislaus, Madera, Santa Cruz, and Monterey counties. These are very important dairy counties, and three or four inspectors would have had all they could have attended to in these counties. Mr. Severin did very efficient work, and as he used an automobile as a mode of conveyance, he covered a great deal of territory. On March 12th last year a firm offered Mr. Severin nearly double the salary we could pay and he resigned.

On August 14, 1910, Mr. J. P. Murphy was appointed inspector for the Bureau. He commenced inspecting in Fresno County and worked down into Tulare and Kings counties. He did thorough work in the

localities inspected and the improvements were great, and though he was a very strict inspector, it appears that he gained the respect and confidence of dairymen wherever he went. In Tulare, where he worked last, on November 9, 1910, the dairymen decided to build a creamery and employ Mr. Murphy as manager at $200.00 per month. To fill his place we secured Mr. C. A. Starkweather, who did excellent work, but it was only about four months when the dairymen at Riverdale decided to build a creamery and engaged him as manager.

During the hot weather in the latter part of May the authorities in Tulare County pressed us so hard for inspection that we engaged Dr. L. M. Steckel to work in that county, but after being engaged two months he got a better position.

Mr. A. V. De Borba worked a few days each month in Marin and Sonoma counties, and Mr. W. H. Perrott has been doing some work in Humboldt County.

About November, 1909, the supervisors of Imperial County proposed to have Mr. E. H. Sherman, who was employed as assistant health officer in that county, appointed State Dairy Inspector without pay. The Bureau furnishes the stationery and other supplies, and Mr. Sherman reports to the Bureau.

Mr. James A. Butler took the district formerly assigned to Mr. Severin, and has, in addition to that, done considerable good work in Lake, Napa, Colusa, and Sutter counties.

Mr. J. S. Canham, of Fresno, was appointed dairy inspector on September 15, 1910. On September 29th he commenced work at Hanford, Kings County, and on November 14th he reported that at least sixty-five new milk houses were either built or under construction as a result of the work done since he came to Kings County.

A special inspector, who had been employed to collect samples of milk, was sent to Lassen and Siskiyou counties, and was engaged there about one month inspecting dairies. During the seventeen months since the last appropriation became available, 6,872 dairies have been inspected and rated.

In the foregoing paragraphs we have dwelt on the difficulty of retaining the inspectors after they had become acquainted with the work and the conditions in their district. This has considerably impeded the work of the Bureau for years. In most all other positions the salaries have been raised, but the dairy inspector's salary has remained the same since the law was enacted in 1905.

The Bureau will recommend that the salary of the inspectors be increased so that we may be able to retain those that have been found reliable, energetic, and possessing good judgment. It is also recommended that $20,000 be added to the appropriation so that four more inspectors can be employed.

In the event that some provision is made for the increase of the funds of the Bureau, we would recommend that the fines collected by the Bureau should be paid directly to the State, and go to the school fund or some other fund, and not be added to the appropriation for the support of the Bureau, because it seldom fails when a case is fought that the attorney for the defense will point out to the jury that the inspector is much interested in the result of the case, since the fine goes toward the payment of his salary. To take that source of revenue away from the Bureau without providing others would cripple it to some extent, because lately nearly enough has been collected to pay the salary and expenses of one inspector.

TESTING APPARATUS.

During the two years intervening since the last report, the officials of this Bureau have examined and certified to the correctness of 5,208 pieces of testing apparatus, out of which two and two tenths per cent have not been approved. In carrying out this work the Bureau finds that there are still some test bottles on the market and in use that are not well adapted to give correct and uniform tests. This refers to the fifty per cent 6-inch cream bottle, the smallest division on the scale of which is one per cent and the length of the scale, at times, is only about two and one quarter inches. The law of some of the states prohibits the use of this type of bottle. The test bottles in use in this State and adapted to give accurate results are the 9-inch fifty or fifty-five per cent bottles, the neck of which will allow a scale of five inches graduated to five tenths of one per cent, the 9-inch thirty per cent bottle, the neck of which will also allow a 5-inch scale and graduated to two tenths of one per cent, in which is weighed a nine-gram sample and the result multiplied by two. The thirty per cent 6-inch bottle with a scale not less than 3 inches in length and graduated to five tenths of one per cent in which a nine-gram sample is weighed and results doubled, will give fairly accurate results and can be used in the old testers which will not admit a nine-inch bottle.

This Bureau will recommend that the use of the 6-inch fifty per cent bottle be prohibited in all factories where milk or cream is bought or sold upon the basis of the butter fat contained therein. Such a law not to take effect immediately, but ample time given the factories to make the change. We also recommend that the milk fat in the scale be read at a temperature not lower than 135 degrees F.

TO PREVENT ADULTERATION OF MILK AND PRODUCTS OF MILK.

This law is much violated and it is often hard to get the judge and jury to see that it is much of an offense to take some of the most valuable constituents (the cream) out of the milk, or to increase the quantity

by adding water to it. It is not taken into consideration that the water added is seldom water that has been analyzed and known to be pure. A few drops of water in milk may sometimes make it unwholesome, how much more so will not ten or (as we sometimes find it) forty per cent of water contaminate it. Much work needs be done yet before the State will be blessed with a pure milk supply. The inspector is sometimes compelled to take the sample of milk from such a can as the driver sees fit to select, as they will claim that some of the cans are skim milk. For that reason it would be desirable if the law provided that all cans or receptacles containing skim milk, where cream or milk is sold, should be marked or have a label attached on which the words "Skim milk" should be printed or stamped.

ICE CREAM.

This important dairy product was not included in Chapter 216, Statutes of 1907, an act to prohibit adulteration and establish standards of quality in said products. This product varies greatly as to per cent of fat and is also sometimes colored to appear of greater value than it is.

MILK FAT.

In subdivision 8, section 2, of above named chapter establishing standards of quality of milk fat, a mistake must have been made in printing by leaving out the words "twenty-four (24) and a specific gravity not less than," after the word "than" where it occurs in the second line of said subdivision.

This Bureau will recommend that the above-named chapter be amended so as to define the standards of ice cream and milk fat.

CHEMICAL PRESERVATIVES.

A few years ago many of the samples of milk collected for analyses were found to contain chemical preservatives. Since the law was passed in 1907 prohibiting their use, they have gradually become less frequent, and during the last two years out of 921 samples examined for preservatives only nine have been found to contain compound of boron, and six have been found to contain formaldehyde.

TO PREVENT MISBRANDING OF BUTTER.

Before the law was enacted in 1905 forbidding the misbranding of butter, it was generally understood that at certain seasons of the year, when the producers of some of the favored brands could not furnish enough butter to supply those that were using it, wholesale dealers in order to supply the deficiency would stamp or wrap other butter to imitate these brands. This was claimed to be an injustice toward those who had established a good reputation for their butter. Hence this law was enacted and the practice has been, we believe, abandoned.

WEIGHTS AND MEASURES.

People of this State are much interested in and demanding a law providing that butter shall be sold by weight, and that said weight shall be the net weight of the butter. Also that milk bottles be required to hold the amount of milk represented. This Bureau will recommend that a law be passed making such provisions.

STATISTICS.

Chapter 369, Statutes of 1905, authorizes the Bureau to gather and compile statistics relative to the dairy industry, but it does not provide that any one must supply the necessary information. In localities where most of the product is produced by large factories it is possible to get a report from nearly all through correspondence, though some will inquire if it is compulsory, and when they find it is not they will not answer. But many of the small factories and the private dairies will not answer our inquiries no matter how often we write to them. It would greatly expedite the work of the Bureau if factories, dairies and those supplying market milk were recorded. It would not be necessary to inconvenience them very much further than to have them send in their names and addresses. A blank could then be sent them every year which they could fill out, giving such information as should be deemed necessary. The Bureau and the inspector would then know what inspections were to be made in the vicinity of every city or town, and accurate statistics could be compiled of the dairy products of the State. If all dairies and factories were required to register every year it would cause but little trouble to report the amount of their output.

SUMMARY OF SUGGESTIONS BY THE STATE DAIRY BUREAU.

That every person or company manufacturing butter, cheese, condensed milk, or other dairy products from more than four cows, and every person or company producing milk or cream from more than four cows, part of which is sold or offered for sale shall cause dairy or factory to be recorded by the State Dairy Bureau on or before the first day of November each year, and that all creameries, cheese factories, condensed milk factories, skimming stations, and private dairies making butter or cheese from more than four cows shall file a report with the State Dairy Bureau, and said report shall show the amount of butter, cheese, condensed milk, ice cream, or other dairy product manufactured during the previous year. That all dairies be required to state the average number of cows milked during said year and whether they produce market milk or milk and cream delivered to factories. And that the State Dairy Bureau shall, on or before October 15th of each year, and after application has been made to have a dairy

or factory recorded, send to each factory a blank upon which to make said report.

That the sum of twenty thousand dollars be added to the appropriation for the use of the State Dairy Bureau.

That all persons who manufacture, sell, or expose for sale any oleomargarine shall procure a license. Manufacturers shall pay $300 per annum; wholesalers and importers shall pay $200 per annum; and retailers shall pay $50 per annum. That manufacturers, wholesalers, and importers of oleomargarine shall keep records of all oleomargarine sales; that every retail dealer shall keep records of all oleomargarine purchased and that said books must be open to inspection by the State Dairy Bureau.

That all dairies must be recorded, and report number of cows kept.

That the inspector's salary be raised to five dollars per day.

That all cheese sold in the State not plainly marked as to its quality, must contain in the water-free substance fifty per cent of milk fat and all cheese marked "half skim" must contain in the water-free substance twenty-five per cent of milk fat or over.

That a standard be established for ice cream and milk fat.

That cans and receptacles containing skim milk be labeled such.

That the scale on a test bottle used with the Babcock test must be of such a length that the amount of fat in the neck can be accurately read to a quarter of one per cent and that samples be read at a temperature not lower than 135 degrees F.

That fines imposed under Chapter 369, Statutes of 1905, Chapter 216, Statutes of 1907, and Chapter 520, Statutes of 1907, be paid directly to the State and go toward the school fund or some other fund.

That all butter be sold by weight and milk bottles be required to hold the amount marked on bottle, or represented to be contained in the bottle.

LABORATORY WORK.

On the seventh day of March, 1910, Mr. Chester F. Hoyt was appointed chemist of the Bureau on recommendation of Professor M. E. Jaffa, Dr. R. G. Brodrick, and other noted chemists. He has shown himself to be a careful and persistent worker, and has devoted all his time to collecting samples of milk and other dairy products in the central part of the State, and to the examination of same. Two special inspectors have occasionally been employed to assist him in collecting samples.

Since December 1, 1908, the following samples of dairy products have been analyzed:

Milk—	
Number of samples examined	921
Number found low in fat	179
Number found low in solids not fat	124
Number found low in fat and solids not fat	125
Total number found below standard	428
Number containing formaldehyde	6
Number containing compound of boron	9
Butter—	
Number of samples examined	46
Number containing more than 16 per cent of water	3
Cheese—	
Number of samples examined	72
Number found low in fat	5
Number found to contain borax	0
Cream—	
Number of samples examined	144
Number found low in fat	3
Condensed milk—	
Number of samples examined	32
Number found low in fat	23
Number found low in total solids	1
Number found low in total solids and fat	2
Skim milk—	
Number of samples examined	5
Buttermilk—	
Number of samples examined	5
Total number of all samples analyzed	1,225

To ascertain whether the milk bottles in use in this State actually contain the volume stamped on them or the volume they may be presumed to contain, this Bureau has examined 389 bottles and has found that 184 of them do contain the required amount or over, and that 205 do not. If a limit of 10 cubic centimeters, or about one third of a fluid ounce, on either side of the exact value be allowed, then 275 bottles fall within this limit, and 114 fall without it. Of these 114 bottles, 26 hold more and 88 hold less than the required amount. No bottles were found to contain as much as thirty cubic centimeters more than the required amount, but 28 were found to contain that much less. Of these 28 bottles 22 fell short by at least forty cubic centimeters. This shortage amounts to about 19 per cent of the contents of the bottle.

While, of course, there is a certain unavoidable variation in the size of the bottles, it may be seen from the above statement that very few of the bottles measured hold notably more than they should, while many do hold very much less than they should. It is hoped that many more bottles may be measured. From the number reported on above, however, it is clear that some means should be provided to prevent the fraudulent use of small bottles. The subject of the contents of the cans in which milk is sold also should receive attention.

STATISTICS.

The producers of dairy products have been slow in complying with our requests for reports on the amount of their output. Through persistent efforts we have succeeded in getting a report from all the large manufacturers, but in counties where there are many small producers we have had to estimate from the number of cows in the county, first deducting the number of cows necessary to supply the population with milk and cream.

The following is the butter produced in the different counties of the State of California during the year ending September 30, 1910.

Where cream has been produced in one county and shipped to another and made into butter, this butter has, as nearly as possible, been credited to the county producing the cream.

From some counties where much of the butter has been produced by private dairies it has been impossible to get all dairies to report, and the output has been partly estimated from the number of milch cows reported by the assessors of those counties after first deducting the number of cows necessary to supply the population of the county or neighboring cities with market milk or sweet cream. As some of the milch cows are sometimes rated as stock cattle by the assessors, it is safe to say that where it has been necessary to estimate part of the output such estimates have been low.

BUTTER PRODUCED DURING YEAR ENDING SEPTEMBER 30, 1910.

County.	Milch Cows.		Pounds of butter, year ending, Sept. 30, 1910
Alameda	6,000		1,870,636
Alpine	425	Estimated	37,000
Amador	1,944	Partly estimated	140,000
Butte	2,672	Reported	353,540
Calaveras	420		
Colusa	2,177	Reported	494,367
Contra Costa	10,000	Reported	561,963
Del Norte	4,000	Partly estimated	665,000
El Dorado	2,500	Reported	224,501
Fresno	30,000	Reported	3,290,825
Glenn	1,642	Reported	213,967
Humboldt	20,000	Reported	4,273,649
Imperial	7,000	Reported	1,948,710
Inyo	1,400	Partly estimated	130,000
Kern	3,000	Reported	565,316
Kings	15,000	Reported	3,218,036
Lake	1,211	Reported	61,200
Lassen	1,900	Reported	331,728
Los Angeles	20,765	Reported	570,402
Madera	700	Reported	73,000
Marin	19,500	Partly estimated	1,300,000
Mariposa	117		
Mendocino	6,250	Reported	854,609
Merced	15,000	Reported	2,510,269
Modoc	250	Reported	33,160
Mono	332	Reported	7,260
Monterey	18,500	Reported	620,940
Napa	9,500	Reported	499,955
Nevada	1,875	Partly estimated	100,000
Orange	5,141	Reported	172,000
Placer	2,832	Partly estimated	200,000
Plumas	2,900	Partly estimated	280,000
Riverside	3,755	Reported	45,872
Sacramento	6,150	Reported	1,102,012
San Benito	4,000	Reported	376,097
San Bernardino	2,500	Reported	118,046
San Diego	5,953	Reported	626,036
San Joaquin	14,180	Reported	1,425,543
San Luis Obispo	25,000	Partly estimated	2,000,000
San Mateo	7,938	Reported	27,765
Santa Barbara	7,620	Reported	649,776
Santa Clara	6,840	Reported	461,965
Santa Cruz	5,203	Reported	378,193
Shasta	2,500	Reported	18,000
Sierra	1,500	Reported	273,920
Siskiyou	4,500	Partly estimated	437,000
Solano	9,000	Reported	1,081,234
Sonoma	26,680	Partly estimated	2,000,000
Stanislaus	17,344	Reported	4,363,296
Sutter	4,064	Reported	464,323
Tehama	1,788	Reported	102,718
Trinity	346		
Tulare	13,581	Reported	3,072,198
Tuolumne	900		
Ventura	1,700	Partly estimated	100,000
Yolo	9,000	Reported	1,103,114
Yuba	1,600	Reported	160,000
Totals	398,595		45,989,141

PRODUCTION OF CHEESE.

The amount of the output of cheese reported is far below what is actually produced in the State and it is impossible to estimate it, as the owners of the factories constantly change from making cheese to the production of cream. It has never been attempted to get a report on other than that made by the ordinary Cheddar process. None of the other factories have been required to register, and there are many of them.

The amount of cheese reported is as follows:

County.	1909. Pounds	1910 Pounds.
Contra Costa	18,960	
El Dorado	-------	4,000
Fresno	36,778	46,000
Inyo	14,750	4,508
Kings	284,250	264,490
Lake	10,000	14,000
Lassen	57,128	84,235
Los Angeles	303,665	
Marin	270,675	45,952
Merced	-------	179,785
Modoc	1,400	14,920
Monterey	885,800	630,108
Napa	32,000	22,000
Placer	10,950	21,900
Sacramento	472,081	293,970
San Benito	241,601	365,745
San Joaquin	146,637	61,978
San Luis Obispo	272,204	328,970
San Mateo	216,197	671,547
Santa Barbara	-------	10,364
Santa Clara	464,952	548,513
Santa Cruz	138,000	225,741
Sierra	17,982	1,288
Siskiyou	47,750	18,715
Sonoma	161,803	216,500
Stanislaus	15,000	91,250
Sutter	267,481	480,869
Yolo	43,150	1,000
Totals	4,431,194	4,648,348

BUTTER AND CHEESE PRICES IN THE SAN FRANCISCO MARKET.

Month.	1908–1909. Butter.	1908–1909. Cheese.	1909–1910. Butter.	1909–1910. Cheese.
October	30.75	12.66	34.75	16.
November	31.44	12.88	32.	17.5
December	33.65	15.05	35.71	12.28
January	36.10	13.94	35.37	18.08
February	35.75	14.25	33.6	18.83
March	30.04	14.65	29.88	17.05
April	23.69	15.38	26.47	14.1
May	25.	13.29	26.6	13.77
June	25.90	13.65	28.2	13.97
July	27.25	14.56	29.3	14.45
August	29.56	15.19	32.	15.2
September	31.66	15.78	31.75	15.68
Average for twelve months	30.0	14.3	31.3	15.6

Compared with former years the receipts of butter in San Francisco show as follows:

	Pounds.
1901	15,222,951
1902	14,823,048
1903	15,511,214
1904	15,713,992
1905	17,936.782
1906	Not available.
1907	15,384,137
1908	14,610,522
1909	14,328,000
1910	13,934,200

BUTTER PRODUCTION.

The following is the estimated butter production for the last fourteen years:

	Pounds.
1897	28,678,439
1898	23,691,028
1899	24,868,084
1900	28,783,859
1901	29,701,202
1902	31,528,762
1903	34,786,289
1904	35,636.969
1905	41,961,047
1906	44,044,578
1907	44,599,211
1908	48,469,585
1909	43,899,018
1910	45,989,140

CONDENSED MILK PRODUCTION.

The following is the condensed milk production for the last twelve years:

	Cases
1899	52,558
1900	66,302
1901	100,140
1902	146,860
1903	126,874
1904	186,905
1905	244,878
1906	113,025
1907	134,907
1908	100,069
1809	83,476
1910	172,916

The following are the monthly receipts of butter in San Francisco for the two years ending September 30, 1910:

1908-1909. Month.	Pounds.	1909-1910. Month.	Pounds.
October	811,000	October	834,700
November	757,600	November	691,300
December	931,400	December	889,600
January	913,100	January	802,300
February	1,001,300	February	916,100
March	1,805,000	March	1,548,600
April	1,848,300	April	1,704,100
May	1,819,400	May	1,667,800
June	1,773,400	June	1,705,300
July	919,000	July	1,096,700
August	875,500	August	1,002,300
September	873,000	September	1,075,400
	14,328,000		13,934,200

ANNUAL VALUE OF DAIRY PRODUCTS.

1909.	
Butter, 43,899,018 pounds	$13,186,044
Cheese, 4,431,194 pounds	632,331
Condensed milk, 4,006,876 pounds	360,618
Market milk and cream consumed	9,025,000
Calves produced on dairies	1,800,000
Skim milk and buttermilk	1,316,970
Casein, 582,910 pounds	29,145
	$26,350,108

1910.	
Butter, 45,989,140 pounds	$14,403,798
Cheese, 4,648,348 pounds	724,212
Condensed and powdered milk, 8,299,989 pounds	756,599
Market milk and cream consumed	9,050,000
Calves produced on dairies	1,850,000
Skim milk and buttermilk	1,400,000
Casein, 1,310,000 pounds	75,000
	$28,259,609

CREAMERIES IN OPERATION IN THE STATE.

Name.	Address.	County.
Livermore Creamery	Livermore	Alameda
American Creamery	Oakland	Alameda
Central Creamery	Oakland	Alameda
Royal Creamery	Oakland	Alameda
California Creamery Company	Oakland	Alameda
Oakland Cream Depot	Oakland	Alameda
Eden Creamery Company	Hayward	Alameda
Island Creamery	Alameda	Alamada
Varsity Creamery	Berkeley	Alameda
Santa Rita Creamery	Pleasanton	Alameda
Ione Creamery Company	Ione	Amador
Gridley Creamery	Gridley	Butte
Rose City Creamery	Chico	Butte
Meridian Creamery	Meridian	Sutter
Danville Creamery	Danville	Contra Costa
Fort Dick Creamery	Crescent City	Del Norte
Crescent Creamery Company	Smith River	Del Norte
Banner Creamery	Smith River	Del Norte
Jersey Farm Dairy Company	Fresno	Fresno
Danish Creamery Association	Fresno	Fresno
Fresno Creamery	Fresno	Fresno
Central Creamery Company	Fresno	Fresno
Selma Creamery	Selma	Fresno
Kerman Creamery	Kerman	Fresno
Orland Creamery	Orland	Glenn
Jacinto Creamery Company	Willows	Glenn
Sunset Creamery Company	Loleta	Humboldt
Grizzly Bluff Creamery	Grizzly Bluff	Humboldt
Swift & Company	Ferndale	Humboldt
Eclipse Creamery	Beatrice	Humboldt
Libby, McNeil & Libby	Loleta	Humboldt
Capital Creamery	Ferndale	Humboldt
Central Creamery Company	Eureka	Humboldt
Central Creamery Company	Ferndale	Humboldt
United Creameries	Arcata	Humboldt
Fairview Creamery	Round Valley	Inyo
El Centro Creamery	El Centro	Imperial
Imperial Creamery Company	Imperial	Imperial
Valley Queen Creamery Company	Brawley	Imperial
Franklin Deaville Company	El Centro	Imperial
Delano Creamery Company	Delano	Kern
Kern County Creamery	Bakersfield	Kern
McFarland Creamery Company	McFarland	Kern
Maple Grove Creamery	Hanford	Kings
Lemoore Cream and Butter Company	Lemoore	Kings
Lucerne Creamery	Hanford	Kings
Clear Lake Creamery	Lakeport	Lake
Kelseyville Creamery	Kelseyville	Lake
Susanville Creamery	Susanville	Lassen
Honey Lake Creamery	Spoonville	Lassen
Standish Creamery	Standish	Lassen
H. A. Bingham	Los Angeles	Los Angeles
Crescent Creamery Company	Los Angeles	Los Angeles
Maple Grove Creamery	Los Angeles	Los Angeles
Sierra Creamery	Madera	Madera
Home Ranch Creamery	Point Reyes	Marin
W. Grandjean & Company	San Rafael	Marin
Fallon Creamery	Fallon	Marin
Light House Creamery	Point Reyes	Marin
Malleard Creamery	San Geronimo	Marin
Sausalito Creamery	Sausalito	Marin
Eclipse Creamery	Point Reyes	Marin
Drake's Bay Creamery	Point Reyes	Marin
Yokayo Creamery Company	Ukiah	Mendocino
Sherwood Creamery Company	Sherwood	Mendocino
C. E. Bishop	Point Arena	Mendocino
Manchester Creamery	Manchester	Mendocino
Point Arena Creamery Company	Point Arena	Mendocino
Alberta Creamery	Point Arena	Mendocino

CREAMERIES IN OPERATION IN THE STATE—Continued.

Name.	Address.	County.
Dairy Delivery Company	Gustine	Merced
Fountain City Creamery	Merced	Merced
Los Banos Creamery	Los Banos	Merced
Surprise Valley Creamery	Cedarville	Modoc
Spreckels Sugar Creamery	Kings City	Monterey
Castroville Creamery	Castroville	Monterey
Salinas Creamery Company	Salinas	Monterey
Bay View Creamery	Napa	Napa
Stewart Creamery	Napa	Napa
Ambrosia Cream Company	Napa	Napa
Taplin Brothers	St. Helena	Napa
Penn Valley Creamery Association	Smartsville	Nevada
Santa Ana Commercial Company	Santa Ana	Orange
Tupper & Stevens	Auburn	Placer
Taylorsville Creamery	Taylorsville	Plumas
Riverside Creamery Company	Arlington Station	Riverside
Crystal Cream and Butter Company	Sacramento	Sacramento
Glendale Creamery	Franklin	Sacramento
The Creamerie	Sacramento	Sacramento
Star Creamery	Courtland	Sacramento
Silver Crest Creamery Company	Sacramento	Sacramento
Elk Grove Creamery	Elk Grove	Sacramento
Model Cream and Butter Company	Hollister	San Benito
Chino Creamery	Chino	San Bernardino
Arrowhead Creamery	San Bernardino	San Bernardino
San Pasquel Creamery	Escondido	San Diego
W. B. Hage	San Diego	San Diego
Valley Creamery	Stockton	San Joaquin
San Joaquin Creamery	Stockton	San Joaquin
Stockton Creamery and Cheese Company	Stockton	San Joaquin
California Polytechnic School	San Luis Obispo	San Luis Obispo
Cayucos Creamery	Cayucos	San Luis Obispo
Diamond Creamery	Cayucos	San Luis Obispo
Maple Grove Creamery	San Luis Obispo	San Luis Obispo
Santa Ysabel Creamery	Paso Robles	San Luis Obispo
San Luis Creamery	San Luis Obispo	San Luis Obispo
Elkhorn Creamery	Santa Barbara	Santa Barbara
Golden Eagle Creamery	Guadaloupe	Santa Barbara
San Jose Creamery Company	San Jose	Santa Clara
Elite Cream and Butter Company	San Jose	Santa Clara
Gold Nugget Butter Company	San Jose	Santa Clara
Live Oak Creamery	Gilroy	Santa Clara
Santa Clara Creamery	Santa Clara	Santa Clara
Model Cream and Butter Company	San Jose	Santa Clara
Commercial Cream and Butter Company	Santa Cruz	Santa Cruz
Watsonville Creamery Company	Watsonville	Santa Cruz
Seaside Creamery	Santa Cruz	Santa Cruz
D. D. Wilder's Creamery	Santa Cruz	Santa Cruz
Cottonwood Creamery	Cottonwood	Shasta
Square Deal Dairy Company	Loyalton	Sierra
Golden Creamery	Etna Mills	Siskiyou
Mountain Valley Creamery	Edgewood	Siskiyou
Dixon Creamery	Dixon	Solano
Suisun Creamery	Suisun	Solano
Union Creamery Company	Vallejo	Solano
Western Creameries	Benicia	Solano
Bodega Creamery	Bodega	Sonoma
Rule's Creamery	Jenner	Sonoma
Russian River Creamery	Duncans Mills	Sonoma
Alpha Creamery	Petaluma	Sonoma
Santa Rosa Creamery	Santa Rosa	Sonoma
Modesto Creamery	Modesto	Stanislaus
Ceres Creamery	Ceres	Stanislaus
Turlock Creamery Company	Turlock	Stanislaus
Stanislaus Creamery Company	Modesto	Stanislaus
Meridian Creamery	Meridian	Sutter
Vina Creamery	Vina	Tehama
Richfield Creamery	Corning	Tehama
Dairyman's Co-operative Creamery	Tulare	Tulare
Good Luck Creamery	Tulare	Tulare

CREAMERIES IN OPERATION IN THE STATE—Continued.

Name.	Address.	County.
Sunflower Creamery	Porterville	Tulare
Tulare Co-operative Creamery	Tulare	Tulare
Visalia Creamery	Visalia	Tulare
Tipton Co-operative Creamery	Tipton	Tulare
Camarillo Dairy	Camarillo	Ventura
University Farm Creamery	Davis	Yolo
Western Yolo Creamery and Ice Company	Winters	Yolo
Woodland Creamery	Woodland	Yolo
Pozzi Creamery	Marysville	Yuba
Laton Co-operative Creamery	Layton	Fresno

CHEESE FACTORIES KNOWN TO BE IN OPERATION IN THE STATE.

Name.	Address.	County.
Orilli Bros.	Lotus	El Dorado
John Cereini	Caruthers	Fresno
C. P. Cigalloti	Caruthers	Fresno
Allen Matlick	Bishop	Inyo
W. D. Roberts	Round Valley	Inyo
Lake Cheese Factory	Hanford	Kings
Frasco Cheese Factory	Hanford	Kings
Upper Lake Cheese and Dairy Company	Lakeport	Lake
H. C. Watson	Beiber	Lassen
F. C. Butler	Novato	Marin
Hubbard & Carmichael Bros.	Newman	Merced
Merced Cheese Factory	Merced	Merced
Surprise Valley Creamery	Cedarville	Modoc
John Penland	Alturas	Modoc
J. M. Pura	Soledad	Monterey
Gerry Pura	Gonzales	Monterey
D. Pedrazzi	Soledad	Monterey
L. Pincini	Soledad	Monterey
P. Bianchi	Gonzales	Monterey
E. S. Waters	Kings City	Monterey
Codoni & Settrini	Natividad	Monterey
Lannini & Vosti	Soledad	Monterey
Giacomazzi & Minetti	Soledad	Monterey
Matt Williams	Gonzales	Monterey
Martha M. Cooper	Monterey	Monterey
Joe Violini & Co.	Salinas	Monterey
Jos. Balestra	Chualar	Monterey
Sarah Neueschwander	Napa	Napa
Albin Scheiber	Lincoln	Placer
G. L. Bryte	Sacramento	Sacramento
J. Holdener	Sacramento	Sacramento
A. Inderbitzen	Cosumne	Sacramento
Martin Detling	Cosumne	Sacramento
Nat. Vanetti	San Juan Batista	San Benito
F. Vile	Gilroy	Santa Clara
O. Orr	Gilroy	Santa Clara
J. F. Dunne	Gilroy	Santa Clara
C. E. Hall	Paicines	San Benito
George Houskin	Thornton	San Joaquin
Henry Finck	Stockton	San Joaquin
Cayucos Creamery Company	Cayucos	San Luis Obispo
Diamond Creamery	Cayucos	San Luis Obispo
J. P. O'Conner	San Luis Obispo	San Luis Obispo
Nigranti Bros.	Cayucos	San Luis Obispo
Clark & Marzorini	San Miguel	San Luis Obispo
J. P. Silva	Morro	San Luis Obispo
John Saxer	Arroyo Grande	San Luis Obispo
V. Mattei	Pescadero	San Mateo
E. A. Shaw	Pescadero	San Mateo
T. E. & L. E. Roe	San Gregorio	San Mateo

CHEESE FACTORIES KNOWN TO BE IN OPERATION IN THE STATE—Continued.

Name.	Address.	County.
J. Bonzani	San Gregorio	San Mateo
Serafin Machado	San Gregorio	San Mateo
John McKay	San Gregorio	San Mateo
Andrew C. Roy	San Gregorio	San Mateo
F. C. Bowen	San Gregorio	San Mateo
Egidio Ghidossi	La Honda	San Mateo
Antone Andrade	San Gregorio	San Mateo
San Gregorio Creamery	San Gregorio	San Mateo
U. L. Wilson	Pescadero	San Mateo
James Zanoni	La Honda	San Mateo
Muscio Cheese Factory	Los Alamos	Santa Barbara
C. R. Wilson	Gilroy	Santa Clara
Rodney Eschenberg	Gilroy	Santa Clara
M. Righetti & Son	Coyote	Santa Clara
A. L. Ellis	Gilroy	Santa Clara
A. Rianda	Gilroy	Santa Clara
G. J. Jarvis	Gilroy	Santa Clara
J. S. Bettencourt	Coyote	Santa Clara
John Manzer	Gilroy	Santa Clara
Charles C. Lester	Gilroy	Santa Clara
Hubbard & Carmichael Brothers	San Jose	Santa Clara
Chesbro & Sawyer	Gilroy	Santa Clara
Richard Brem	Gilroy	Santa Clara
Joseph Hosang	Gilroy	Santa Clara
James C. Zuck	Gilroy	Santa Clara
A. Gianone	Swanton	Santa Cruz
P. Scaroni	Santa Cruz	Santa Cruz
J. Filipini	Davenport	Santa Cruz
P. Badasci	Watsonville	Santa Cruz
C. Calinchini	Davenport	Santa Cruz
Charles Lombardi	Santa Cruz	Santa Cruz
V. Pansiera	Davenport	Santa Cruz
A. Mocettini	Santa Cruz	Santa Cruz
E. B. Church	Sattley	Sierra
C. Tonella	Loyalton	Sierra
A. G. Silva	Etna Mills	Siskiyou
Thomas Patton	Fort Jones	Siskiyou
John Arnstalden	Sonoma	Sonoma
John Offutt	Petaluma	Sonoma
Cantel & Cantel	Petaluma	Sonoma
Togni & Bravo	Crows Landing	Stanislaus
Minden Brothers	Nicolaus	Sutter
F. H. Bennett	Verona	Sutter
A. D. Arfsten	Nicolaus	Sutter
F. G. Scott & Sons	Tudor	Sutter
Scheiber Brothers	Nicolaus	Sutter
J. S. Troneatty	Tudor	Sutter
R. D. Murphy	Verona	Sutter
Thomas Reddington	Verona	Sutter
A. Linggi	Verona	Sutter
Frank Schibig	Nicolaus	Sutter
University Farm	Davis	Yolo

FINANCIAL STATEMENT.

Sixtieth Fiscal Year.

Available Funds.

Appropriation	$5,000 00	
Fines and fees paid to the state	874 01	
		$5,874 01

Disbursements.

Telephone service	$105 79	
Office rent	720 00	
Press clipping service	27 00	
Office supplies	24 58	
Laboratory supplies	27 02	
Traveling expenses of Wm. H. Saylor	63 25	
Salary of Wm. H. Saylor	2,350 00	
Notary fees	7 50	
Towel service	12 00	
Miscellaneous employments	26 15	
Printing	16 50	
Traveling expenses of J. A. Bliss	7 60	
Per diem of J. A. Bliss	40 00	
Telegrams	6 55	
Postage stamps	45 50	
Cheese branding stencils	1 20	
Per diem salary of J. L. Starr	588 00	
Traveling expenses of J. L. Starr	469 55	
Exchange on drafts	3 46	
Per diem salary of W. H. Perrott	64 00	
Traveling expenses of W. H. Perrott	32 00	
Traveling expenses of F. W. Andreasen	51 50	
Per diem of F. W. Andreasen	20 00	
Per diem salary of J. H. Severin	636 25	
Traveling expenses of J. H. Severin	331 90	
Expressage	5 00	
Services of stenographer	158 55	
Traveling expenses of M. T. Freitas	3 00	
Per diem of M. T. Freitas	30 00	
Unexpended balance	16	
		$5,874 01

FINANCIAL STATEMENT—Continued.

Sixty-first Fiscal Year.

Available Funds.

Appropriation	$12,500 00	
Fines and fees paid to the state	810 86	
		$13,310 86

Disbursements.

Telephone service	83 80
Office rent	720 00
Press clipping service	7 50
Office supplies	169 82
Laboratory supplies	547 09
Traveling expenses of Wm. H. Saylor	20 60
Salary of Wm. H. Saylor	400 00
Traveling expenses of A. V. De Borba	129 70
Salary of A. V. De Borba	188 00
Notary fees	10 00
Towel service	8 25
Miscellaneous employment	17 60
Printing	267 25
Salary of Chester F. Hoyt	452 50
Traveling expenses of Chester F. Hoyt	61 29
Telegrams	3 10
Postage stamps	76 70
Stenographer's salary	432 00
Salary of James A. Butler	464 00
Traveling expenses of James A. Butler	440 80
Salary of L. M. Steckel	104 00
Traveling expenses of L. M. Steckel	99 30
Office equipment	81 52
Miscellaneous expenses	46 27
Salary of James Andreasen	115 00
Traveling expenses of James Andreasen	169 45
Cheese branding stencils	3 90
Exchange on drafts	4 67
Salary of W. H. Perrott	348 00
Traveling expenses of W. H. Perrott	340 30
Traveling expenses of F. W. Andreasen	213 74
Salary of F. W. Andreasen	1,550 00
Salary of J. H. Severin	792 50
Traveling expenses of J. H. Severin	1,216 05
Expressage	18 07
Salary of J. L. Starr	1,012 00
Traveling expenses of J. L. Starr	1,049 70
Per diem of M. T. Freitas	60 00
Traveling expenses of M. T. Freitas	5 70
Per diem of E. P. Nissen	50 00
Traveling expenses of E. P. Nissen	69 75
Per diem of J. R. Murphy	50 00
Traveling expenses of J. R. Murphy	70 65
Traveling expenses of J. P. Murphy	253 70
Salary of J. P. Murphy	284 00
Salary of C. A. Starkweather	304 00
Traveling expenses of C A. Starkweather	220 10
Salary of N. J. Lund	133 00
Traveling expenses of N. J. Lund	145 30
Unexpended balance	19
	$13,310 86

COURT PROCEEDINGS.

From December 1, 1908, to December 1, 1910.

No.	Defendant.	Place of trial.	Charge.	Result.
1	Joe Gilardi	San Luis Obispo	Unsanitary dairy	*Dismissed
2	Sam Yow	Modesto	Milk adulteration	Fined $10
3	S. Attransini	Modesto	Milk adulteration	Fined $10
4	Jason & Kass	Vallejo	Milk adulteration	Acquitted
5	John Vayanos	Vallejo	Milk adulteration	Fined $25
6	Chas. Fenger	Vallejo	Milk adulteration	Fined $25
7	A. Adams	Vallejo	Milk adulteration	Fined $25
8	George Pappalion	Vallejo	Milk adulteration	Fined $25
9	George Ballas	Vallejo	Milk adulteration	Pending
10	J. C. Hefley	Santa Ana	Unsanitary dairy	Fined $20
11	L. C. Sailsbury	Imperial	Unsanitary dairy	Pending
12	T. W. Davis	El Centro	Unsanitary dairy	Fined $10
13	F. J. Peacock	El Centro	Unsanitary dairy	Defendant not apprehended
14	J. Bucher	El Centro	Unsanitary dairy	Sentence suspended
15	J. F. Bates	El Centro	Unsanitary dairy	Sentence suspended
16	A. H. Rogers	Holtville	Unsanitary dairy	Fined $30
17	H. J. Parker	Imperial	Unsanitary dairy	Fined $25
18	D. K. Woode	Holtville	Unsanitary dairy	Fined $30
19	J. Taylor	Holtville	Unsanitary dairy	Co-defendant
20	G. McFadden	Holtville	Unsanitary dairy	Co-defendant
21	F. Karales	Santa Ana	Unsanitary dairy	Fined $20
22	R. L. Forcythe	Santa Ana	Milk adulteration	*Dismissed
23	R. Serrano	Riverside	Unsanitary dairy	Fined $25
24	Al Ralsted	Riverside	Unsanitary dairy	Fined $25
25	S. P. Serrano	Riverside	Unsanitary dairy	Fined $25
26	N. H. McCoy	Los Angeles	Unsanitary dairy	Fined $20
27	—— Manako	Los Angeles	Milk adulteration	Fined $25
28	M. S. Learnardi	Modesto	Unsanitary dairy	Fined $10
29	Thos. Caswell	Modesto	Unsanitary dairy	Fined $10
30	J. D. Correia	Modesto	Unsanitary dairy	Fined $10
31	W. W. Weltmore	Fresno	Unsanitary dairy	Fined $25
32	C. Bruini	San Luis Obispo	Using chemicals	Fined $25
33	C. Guzzi	San Luis Obispo	Using chemicals	Fined $25
34	R. Luni	San Luis Obispo	Using chemicals	Fined $25
35	Joe Gularte	San Luis Obispo	Unsanitary dairy	Fined $30
36	Jas. Sangunetti	Stockton	Unsanitary dairy	Fined $10
37	John Guggia	San Luis Obispo	Unsanitary dairy	Fined $15
38	Peter Guggia	San Luis Obispo	Unsanitary dairy	Fined $15
39	R. H. Wilson	Los Angeles	Unsanitary dairy	Acquitted
40	D. M. Dunsmore	Los Angeles	Unsanitary dairy	Fined $25
41	C. Garboni	El Centro	Unsanitary dairy	Fined $10
42	H. Thiessen	Stockton	Unsanitary dairy	Fined $25
43	C. Gambetti	Los Banos	Unsanitary dairy	Fined $25
44	S. M. Alfonso	Los Banos	Unsanitary dairy	Fined $25
45	Jos. Futardo	Los Banos	Unsanitary dairy	Fined $25
46	Joe M. DeSilva	Los Banos	Unsanitary dairy	Fined $25
47	J. J. Inwall	San Jacinto	Unsanitary dairy	Fined $10
48	R. M. Davis	San Jacinto	Unsanitary dairy	Plead guilty. Sentence suspended
49	W. H. Shively	Hemet	Unsanitary dairy	Fined $10
50	M. T. Silva	San Luis Obispo	Unsanitary dairy	Fined $50
51	J. Guimini	San Luis Obispo		Fined $50
52	M. Garcia	San Luis Obispo	Milk adulteration	Fined $25
53	Ed Gaggoini	San Luis Obispo	Unsanitary dairy	Fined $25
54	Fred Gaggoini	San Luis Obispo	Unsanitary dairy	Fined $25
55	P. Mogensen	San Jose	Milk adulteration	Jury disagreed
56	A. D. Johnson	San Jose	Milk adulteration	Fined $25
57	S. Donati	San Luis Obispo	Unsanitary dairy	Fined $40
58	L. Belliga	San Luis Obispo	Unsanitary dairy	Fined $30
59	D. Mitchell	Vallejo	Milk adulteration	Defendant not, apprehended
60	Geo. Papas	Vallejo	Milk adulteration	Fined $25
61	M. C. Borges	Vallejo	Milk adulteration	Fined $25
62	Geo. Costas	Vallejo	Milk adulteration	Fined $25
63	George Watanabe	Vallejo	Milk adulteration	Fined $25

*Dismissed on motion of prosecuting attorney.

COURT PROCEEDINGS—Continued.

No.	Defendant.	Place of trial.	Charge.	Result.
64	C. J. Hatch	San Mateo	Milk adulteration	Defendant not apprehended
65	Joe Gularte	San Luis Obispo	Unsanitary dairy	Fined $30
66	F. Delidio	San Luis Obispo	Unsanitary dairy	Fined $30
67	Frank Alvernaz	San Luis Obispo	Unsanitary dairy	Fined $50
68	John McMillan	Riverside	Unsanitary dairy	Fined $10
69	S. Yoneta	Fresno	Unsanitary dairy	Fined $50
70	A. Borgouinshi	Fresno	Unsanitary dairy	Fined $30
71	J. V. Winship	Riverside	Unsanitary dairy	Fined $25
72	Louis Baral	Riverside	Unsanitary dairy	Fined $10
73	F. A. Fellows	Santa Rosa	Milk adulteration	Sentence suspended
74	F. B. Bianchi	Santa Rosa	Milk adulteration	Sentence suspended
75	Cardoza Brothers	Laton	Unsanitary dairy	Fined $30
76	H. C. Hovland	Berkeley	Milk adulteration	Fined $25
77	Jerry Cooper	Hayward	Milk adulteration	Sentence suspended
78	W. B. Snow	Oakland	Milk adulteration	Fined $25
79	R. F. Colby	Santa Ana	Unsanitary dairy	Fined $10
80	L. F. Platt	Santa Ana	Unsanitary dairy	Fined $10
81	Tim Roderi	Cambria	Unsanitary dairy	Fined $20
82	C. C. Potter	Cambria	Unsanitary dairy	Fined $20
83	Joe Fiscalini	Cambria	Unsanitary dairy	Fined $20
84	J. Anderson	San Leandro	Milk adulteration	Fined $25
85	C. Silva	San Leandro	Milk adulteration	Fined $25
86	C. Silva	San Leandro	Milk adulteration	Judgment suspended
87	F. Madden	Stockton	Milk adulteration	Fined $25
88	F. F. Giotonini	Stockton	Milk adulteration	*Case dismissed
89	R. L. Harris	Stockton	Milk adulteration	*Case dismissed
90	W. W. Whitescarver	Stockton	Milk adulteration	*Case dismissed
91	M. S. Leal	Stockton	Milk adulteration	*Case dismissed
92	A. C. Nettleship	Stockton	Milk adulteration	*Case dismissed
93	F. C. Turner	Stockton	Milk adulteration	*Case dismissed
94	F. Del Monte	Stockton	Milk adulteration	*Case dismissed
95	C. S. Fitch	Sonora	Milk adulteration	Case pending
96	M. E. Sanfrid	Sonora	Milk adulteration	Case pending
97	Manuel Seimas	Laton	Unsanitary dairy	Fined $20
98	F. Montgomery	Sacramento	Milk adulteration	Judgment suspended
99	L. H. Demer	Sacramento	Milk adulteration	Judgment suspended
100	M. J. Marincovich	Sacramento	Milk adulteration	Judgment suspended
101	Miss Loque	Sacramento	Milk adulteration	Judgment suspended
102	N. Traversi	Sacramento	Milk adulteration	*Case dismissed
103	H. Honnegar	Sacramento	Milk adulteration	*Case dismissed
104	J. J. Lonby	Sacramento	Milk adulteration	*Case dismissed
105	C. Marino	Sacramento	Milk adulteration	*Case dismissed
106	D. Balsam	Sacramento	Milk adulteration	*Case dismissed
107	H. Drury	Sacramento	Milk adulteration	*Case dismissed
108	N. Demis	Sacramento	Milk adulteration	*Case dismissed
109	A. Marty	Sacramento	Milk adulteration	*Case dismissed
110	Webster & Navroydis	Sacramento	Milk adulteration	*Case dismissed
111	H. Lau	Sacramento	Milk adulteration	*Case dismissed
112	T. Nagaoka	Sacramento	Milk adulteration	*Case dismissed
113	Schaefer Grotsch	Sacramento	Milk adulteration	*Case dismissed
114	M. Ginsberg	Sacramento	Milk adulteration	*Case dismissed
115	M. E. Kilaydakis	Sacramento	Milk adulteration	*Case dismissed
116	Peter Karkampas	Sacramento	Milk adulteration	*Case dismissed
117	A. Marty	Sacramento	Milk adulteration	*Case dismissed
118	A. J. Carragher	Sacramento	Milk adulteration	Acquitted
119	G. E. Graft	San Jose	Milk adulteration	Disagreement
120	Claude D. Van Derson	Eureka	Milk adulteration	Fined $25
121	J. L. Vignes	Long Beach	Unsanitary dairy	Fined $25
122	H. M. Williams	Long Beach	Unsanitary dairy	Fined $25
123	G. W. Sanderson	Long Beach	Unsanitary dairy	Fined $25
124	W. H. Westover	Long Beach	Unsanitary dairy	Fined $25
125	R. L. Bisby	Long Beach	Milk adulteration	Fined $25
126	O. Crook	Oakland	Milk adulteration	Fined $25
127	Geo. B. Gray	Oakland	Milk adulteration	*Case dismissed
128	J. Ponte	Oakland	Milk adulteration	Fined $25
129	John Mitrovich	Oakland	Milk adulteration	Fined $25
130	R. J. Schaefer	Oakland	Milk adulteration	Fined $25
131	Mrs. Mary Roach	Redondo	Milk adulteration	*Case dismissed
132	H. W. Barlow	Redondo	Milk adulteration	Fined $25

*Dismissed on motion of prosecuting attorney.

COURT PROCEEDINGS – Continued.

No.	Defendant.	Place of trial.	Charge.	Result.
133	R. L. Harris	Stockton	Milk adulteration	Fined $25
134	G. LaNata	Stockton	Milk adulteration	Fined $25
135	J. Capitanich	Stockton	Milk adulteration	Fined $25
136	R. Stolberg	Stockton	Milk adulteration	Fined $25
137	J. L. Willits	El Monte	Unsanitary dairy	Fined $10
138	J. W. Hawlick	San Jose	Milk adulteration	Fined $50
139	M. S. Brown	Hanford	Unsanitary dairy	Fined $10
140	George Schandona	Norwalk	Unsanitary dairy	Fined $10
141	Ed Leiber	El Monte	Unsanitary dairy	*Case dismissed
142	L. A. Hudden	Riverside	Unsanitary dairy	Sentence suspended
143	I. N. Camp	Riverside	Unsanitary dairy	Sentence suspended
144	S. B. Wilkins	Riverside	Unsanitary dairy	Fined $10
145	John Cardoza	Hanford	Unsanitary dairy	Fined $10
146	Boneito & Lende	Hanford	Unsanitary dairy	Fined $25
147	J. H. Silva	Hanford	Unsanitary dairy	Fined $25
148	A. Nagao	Bakersfield	Unsanitary dairy	Fined $20
149	A. Oliver	Kern	Unsanitary dairy	Fined $20
150	F. T. Baldwin	Kern	Unsanitary dairy	Fined $20
151	J. Weichelt	Bakersfield	Unsanitary dairy	Fined $20
152	S. Miwa	Bakersfield	Unsanitary dairy	Fined $20
153	T. Matsuda	Bakersfield	Unsanitary dairy	Fined $20
154	Y. Sugimma	Bakersfield	Unsanitary dairy	Fined $20
155	Joe V. Muley	Bakersfield	Unsanitary dairy	Fined $20
156	A. Barrington	Monrovia	Unsanitary dairy	Fined $20
157	C. A. Wright	Monrovia	Unsanitary dairy	Fined $20

*Dismissed on motion of prosecuting attorney.

SUMMARY OF CASES.

19 defendants fined $10	$190 00
2 defendants fined 15	30 00
17 defendants fined 20	340 00
49 defendants fined 25	1,225 00
8 defendants fined 30	240 00
1 defendant fined 40	40 00
6 defendants fined 50	300 00
	$2,365 00

3 defendants acquitted.
2 defendants not convicted, jury disagreeing.
3 defendants not apprehended.
13 cases in which sentence was suspended.
28 cases dismissed, on motion of prosecuting attorney.
4 cases pending.
2 cases against codefendants.

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FIFTH BIENNIAL REPORT

OF THE

STATE VETERINARIAN

OF CALIFORNIA

FOR THE TWO YEARS ENDING JUNE 30, 1910

CHARLES KEANE, D.V.S., State Veterinarian.
W. E. D. MORRISON, D.V.M., Assistant State Veterinarian.
J. P. IVERSON, Deputy State Veterinarian.
M. W. MAXWELL, Clerk.



SACRAMENTO
W. W. SHANNON - - - - - SUPERINTENDENT OF STATE PRINTING
1910

REPORT OF THE STATE VETERINARIAN.

To His Excellency, JAMES N. GILLETT,
Governor of California.

In presenting the biennial report of this department for the sixtieth and sixty-first fiscal years, it is very gratifying for the State Veterinarian to report the continued progress that has been made in the work of controlling and eradicating some of the communicable diseases of live stock within the borders of this State, and the prevention of disease being carried in from other states and territories.

It is also most pleasing to report the advance in prosperity of our live stock industry. It might be well in this report to mention some facts in reference to the live stock industry in California, showing the enormous amount of capital invested therein and what its protection means to this State.

On January 1, 1910, the number, average price, and farm value of horses, mules, sheep, milch cows, and other classes of cattle and hogs in California are given in the report of the Secretary of the United States Department of Agriculture, as follows:

	Number.	Average price per head.	Farm value.
Horses	420,000	$105 00	$44,100,000 00
Mules	83,000	122 00	10,126,000 00
Sheep	2,372,000	3 30	7,827,600 00
Milch cows	452,000	38 40	17,356,800 00
Other cattle	1,120,000	20 10	22,512,000 00
Hogs	540,000	8 20	4,428,000 00
Totals	4,987,000		$106,350,400 00

It can be readily seen from the above figures that our live stock industry is an enormous one and should have adequate protection. Irregardless of new innovations, such as gas engines, electrical inventions and automobiles, the horse and mule industry of this State has prospered; in fact, during the past decade horses and mules have more than doubled in value, and have increased very materially in numbers.

The value of all classes of cattle has also shown marked advances during the past decade. While there has been a slight decrease in the number of range cattle there has been a large increase in the number of milch cows. This is due to the fact that many of the large ranges

in the Sacramento and San Joaquin valleys are constantly being cut up into smaller ranches, and with the development of irrigation are turned into dairies. The dairy industry is constantly growing in California, and, with our ideal conditions for such an industry, it is only a question of time when California will be one of the leading dairy states of the Union.

With the rapid development of our dairy industry there should have been a corresponding increase in our swine production. This industry has, however, not made any appreciable strides in point of numbers during the past few years. The reason for this is due solely to the fact that the raising of hogs is an hazardous business on account of prevalent communicable diseases, such as cholera. This subject will be more extensively dwelt upon later on in this report, and I shall endeavor to show how our swine industry can be encouraged and built up by adequate State protection.

By the enactment of suitable laws in the last session of the legislature, this department has been able to extend its sphere of usefulness to the live stock industry. The act requiring all veterinarians in the State to immediately report outbreaks of infectious diseases to the State Veterinarian has uncovered many foci of disease which hitherto would never have come under our observation. This is particularly true in the case of the disease known as glanders, in horses and mules. Upon receiving a report of such a disease, this department immediately proceeds to investigate and uncover, if possible, any other cases in the immediate neighborhood of the affected animal. All contact horses and mules are tested with mallein. Furthermore, all affected animals are now destroyed in conformity with section 402*b* of the Penal Code, and proper sanitary precautions are taken to prevent further spread of the disease.

The work of this department not only deals with the live stock industry, but indirectly it has an important relation to human health. A number of animal infections are directly communicable to man, and in our work in handling such diseases it is essential that precautions be taken to guard against the spread of the infection to man. This is particularly true in such diseases as anthrax, glanders, and rabies. In several instances these animal diseases have caused fatalities in human beings in California during the past two years.

During the two years just past this department has paid particular attention to the suppression of such infections as glanders in horses and mules, anthrax in all animals, the cattle tick, scabies in sheep, and rabies. While we have endeavored to investigate every reported outbreak of disease, we have found that by centering our efforts in the suppression and eradication of certain diseases known to exist in various parts of the State, better results could be accomplished than

by scattering our efforts. This is particularly true in the fight against the cattle tick (*Margaropus annulatus*), scabies in sheep, and glanders in horses and mules.

CATTLE TICK ERADICATION.

Our policy in continuing to systematically eradicate the cattle tick (*Margaropus annulatus*), the carrier of Texas or Southern cattle fever infection in cattle, has resulted in the freeing of many herds of cattle from this parasite during the past two years, and the consequent removal from State and Federal quarantines of large areas of territory. In this work California has had the coöperation of the United States Bureau of Animal Industry, working under a special appropriation from congress to coöperate with quarantined states. The Federal, State, and County live stock inspectors supervise the disinfection of cattle and maintain State quarantines in conformity with State laws on the subject, and also make inspections of cattle in the provisionally quarantined areas for movement to noninfected areas in this State.

Every infested herd is disinfected at regular intervals by the inspector of the district. The parasiticide used is an arsenical solution that is first mixed by the inspector, in order that the solution may be of proper potency to kill the ticks but not injure the cattle. Infested cattle are dipped every thirty days during the tick season, with a view of destroying the ticks before the females have matured sufficiently to drop off and ovulate. In this manner regeneration of the tick is prevented, and under ideal conditions all ticks on a ranch are destroyed in one year. However, ideal conditions are not always obtained in a work of this magnitude, and from a number of causes this work of cleaning a ranch may be prolonged several years.

Ticks have been eradicated from nearly all of our larger cattle ranges by the simple method of removing all the cattle, horses and mules from the infected range for a period of at least eight months, after which time the parasites die from starvation. During the past two years, however, tick infestation has been confined to the smaller beef ranges and dairies, in the majority of which places tick eradication has been conducted through means of dipping in the arsenical solution on account of the fact that through lack of sufficient range it is impossible to carry out the starvation method.

Our work in this line has met with continued success. In fact, California is far in the lead of other tick infested states in results accomplished. During the past two years we have kept pace with the work accomplished in the two years before, as is evidenced by the following area of territory freed from ticks and taken out of quarantine.

During 1909 the territory removed from the Southern cattle fever quarantine was as follows:

All of Imperial County.

All of those parts of San Bernardino and Riverside counties situated east of the one hundred and sixteenth meridian, west longitude.

San Diego and Orange counties were placed in the provisionally quarantined areas, from which cattle can be moved at all times of the year after they have been inspected and found free from tick infestation. This privilege was granted to these two counties on account of the fact that the work has progressed so well therein that only a comparatively small number of herds were still tick infested, and these being under strict quarantine and undergoing process of cleaning, there was no danger to outside cattle in allowing cattle from these counties to move after they had been inspected and found tick free.

On March 1, 1910, by proclamation issued by your Excellency, there was removed from all quarantine restriction and placed in the free area the following territory: All of Los Angeles and Ventura counties; the balance of Riverside County, *i. e.*, that part of Riverside County situated west of the one hundred and sixteenth meridian, west longitude; and the balance of San Bernardino County, with the exception of six townships situated near the Mojave River.

There was also removed from quarantine, in same proclamation, all that part of San Luis Obispo County situated east of the summit of the Santa Lucia range of mountains.

This leaves at the present time the following areas in this State quarantined for cattle ticks: San Diego, Orange, and Santa Barbara counties; the western part of San Luis Obispo County; one township in Fresno County; one township in Kings County; two townships in Tulare County; and six townships in San Bernardino County. These districts are only provisionally quarantined, however, and cattle can be moved from them to other sections in this State, after the cattle have been inspected and found tick free.

While the coöperation we have received from the stockmen in this work has been practically unanimous, we have had in a number of instances some strenuous opposition, and in some of these instances it has been found necessary to resort to the forcible seizure and disinfection of cattle under the provisions of the act of the legislature that gives the State Veterinarian authority to seize and disinfect a herd of tick infested cattle, and hold same as a lien for the expenses incurred in so doing, in case the owner refuses to disinfect his cattle. In other cases the mere threat to use this power has been sufficient to force owners of infested cattle to dip.

With the rapid cleaning up of the tick infested area of this State, we have the gradual elimination of the immune cattle. The cattle now raised on these tick free ranches of the south are just as susceptible to Southern cattle fever as are the cattle of the north. This fact necessitates very careful observance in the maintenance of quarantines. I

am pleased to report, however, that only in a few instances were our quarantine regulations infracted. One party was convicted and fined in Kings County, while another was fined in San Diego County, and a third party was acquitted in San Diego County on technical grounds.

While it is only a matter of a few years ago that Southern cattle fever was the bane of California cattlemen in the central and southern counties, resulting in great losses of cattle annually, I am pleased to report that during the past two years the fatalities in California cattle from this disease were practically nil.

A number of reports have been received in this office during the past two years of cattle infested with fever ticks in counties located outside of the quarantined area. Each report has been investigated through this department, but no Texas fever ticks (*Margaropus annulatus*) were found. In each instance other varieties of harmless ticks were found infesting cattle, their identity having been confounded by those reporting with the fever ticks.

During the past two years 463 inspections, aggregating 29,519 head of cattle, were made for movements of cattle from the quarantined area to points outside of same in this State.

GLANDERS.

This disease continues to be a menace to the horse and mule industry of this State. Since the enactment of the act of March 19, 1909, requiring the reporting by veterinarians of glanders to this office, more or less systematic efforts have been made to eradicate this infection. However, some conception of the prevalence of this disease among equines in California might be gleaned from the number of reports that we have received after the passage of this act.

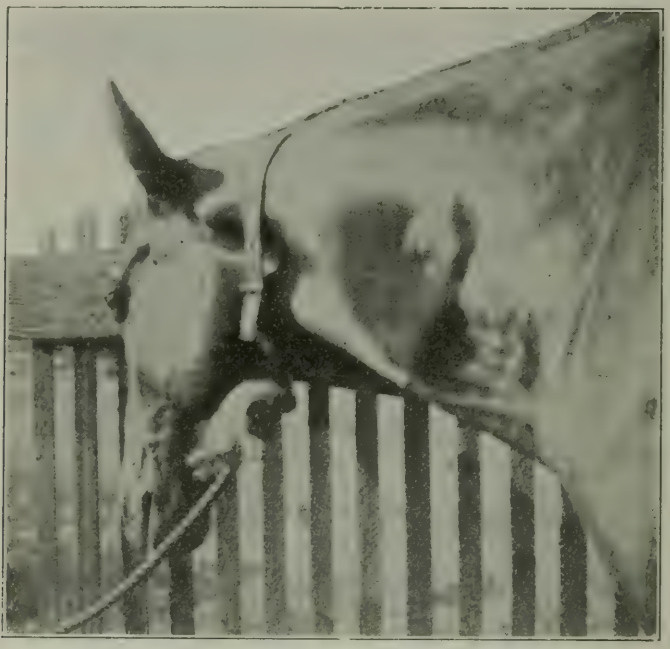
Prior to the enactment of this law a horse or mule affected with glanders might be brought to a veterinarian, who, after diagnosing the disease, would advise the owner to destroy the animal and test the contacts. While in some instances the veterinarian's advice would be followed, in other instances, however, it would not. In the latter case it was more than likely that the affected animal would be sold or traded, and in this manner scatter the disease to other animals. It was a very common practice to hear of a horse affected with chronic glanders change ownership a number of times. Just as soon as the owner suspected or was informed of the condition of the animal, he traded it off or sold it. Of course in a number of instances this was done without the owner having a true knowledge of the dangerous nature of the disease. But the result was just the same in the infecting of other animals.

With the enactment of the law requiring the immediate reporting of such cases to the State Veterinarian, we have been enabled to

early investigate each outbreak of this disease, cause the clinically affected animals to be destroyed, and test the contact animals for the purpose of ascertaining if any of them are affected internally without exhibiting external symptoms of this disease.

It can be readily seen how necessary it is for this department to obtain an early report of an outbreak of glanders, in order that adequate measures may be taken to exterminate the disease and prevent its further dissemination among healthy animals.

Quite as important is the detection of occult cases of this disease,



Case of occult glanders, showing well marked local reaction to mallein.

i. e., those cases in which the lesions are confined to the internal organs. It is here that the difficult part of our work is presented. After testing a number of animals with which one clinical case of glanders has been in contact, we invariably find one or more animals which react to the test, showing that they are affected with the disease internally. In many instances these animals appear to be, from all external appearances, just as healthy as animals which have passed the test, and it is a difficult matter at times to convince the owners that these animals are also affected with glanders.

Glanders is similar to tuberculosis in many respects, one of which is that an animal may be affected and still show very little loss of condition. Then, again, infection in these animals may be of recent

origin and the lesions so slight as not to affect as yet the general economy of the animal. Still if these animals are allowed to live and constantly come into contact with healthy animals, they are capable of spreading the infection. The history of glanders has repeatedly shown that where only the clinical cases were destroyed in a stable or on a ranch, and the remaining contact animals left untouched, the disease would reappear in the form of clinical cases from time to time.

There are several tests that are used for glanders, but the most universally recognized one is the mallein test. Mallein is a biological product prepared in a laboratory from the growth and development of an artificial culture of the germ that causes this disease (*Bacillus mallei*). After a suitable growth of the organism in an incubator, all life in the culture is destroyed by heat, and the dead germs are later filtered out. The filtrate is the substance used in the mallein test. When injected subcutaneously into animals affected with either the external or internal forms of glanders it causes an appreciable rise of body temperature, and quite often considerable edema at seat of injection, malaise, etc. In the hands of a veterinarian who is careful, and with the use of approved mallein, the percentage of errors in diagnosis are exceedingly small.

While an owner in possession of one or more horses or mules affected with glanders should, in protecting his other animals from this disease, be glad to destroy them, it appears to the writer that the destruction of one or more animals affected with this disease is a protection to the entire horse and mule industry of the State. It seems then that some equitable measure should be adopted by this State to reimburse owners for a part of the value of an animal destroyed for glanders. This seems particularly just in cases in which the animals are able to work. This system is in vogue in several of the Eastern States of this country, as well as in the Dominion of Canada. There are two means by which this can be accomplished, viz., either by a direct appropriation for this purpose, or by enacting legislation taxing the horse and mule industry of California for this specific purpose. I am rather inclined to favor the latter. I realize that it would be difficult to obtain a sufficient appropriation from the legislature for this purpose. In the past twelve months the value of horses and mules killed for glanders in California, computing their value at about one hundred dollars per head, was approximately $70,000.00. If owners were reimbursed a part of the value of destroyed animals, this amount would be raised considerably on account of the fact that many more cases of glanders would be reported to this office directly by the owners, instead, as happens in many instances now, of being kept hidden.

Such a system of reimbursement would in a likewise manner assist greatly in the work of extermination of this disease. While the fund for this purpose would necessarily require to be quite large for the first two to four years, it would only be a comparatively short time when by legislative action the rate of taxation could be lowered on account of the fact that the bulk of the work of glanders extermination would be accomplished during the first few years after this system was adopted.

During the past two years the following outbreaks of glanders were reported. As will be noted the majority of these reports date from the passage of the act of the last legislature requiring the reporting by veterinarians of glanders and other communicable diseases of animals to the State Veterinarian:

	Tested.	Destroyed without test.	Tested and passed.	Held for retest.	Tested and destroyed.	Total number destroyed.
Riverside	0	3	0	0	0	3
Tehama	17	0	13	0	4	4
Santa Clara	8	3	1	0	7	10
Alameda	158	27	104	9	44	71
Orange	279	18	239	28	12	30
San Diego	25	13	17	1	7	20
Madera	163	19	107	34	22	41
Mariposa	7	2	2	2	3	5
Glenn	40	1	6	20	14	15
Kings	61	11	27	13	21	32
Kern	8	3	0	0	8	11
Santa Barbara	13	4	12	1	0	4
Tuolumne	1	6	0	0	1	7
Sutter	0	5	0	0	0	5
Monterey	32	9	24	0	8	17
Marin	0	1	0	0	0	1
Placer	2	3	0	0	2	5
Trinity	0	1	0	0	0	1
San Benito	13	2	5	4	4	6
Nevada	0	1	0	0	0	1
Stanislaus	101	23	83	26	12	35
Amador	1	0	0	0	1	1
San Mateo	0	1	0	0	0	1
Sacramento	30	1	12	5	13	14
Los Angeles	158	35	104	15	39	74
Shasta	21	0	0	8	13	13
Siskiyou	1	0	0	0	1	1
Mendocino	5	1	4	0	1	2
San Joaquin	168	30	125	26	17	47
Butte	161	2	113	23	25	27
San Bernardino	6	11	1	0	5	16
San Francisco	126	39	67	33	26	65
Santa Cruz	8	6	5	1	2	8
Napa	37	4	31	3	3	7
San Luis Obispo	16	13	6	2	8	21
Fresno	158	31	73	59	26	57
Yuba	2	2	1	1	0	2
Merced	76	20	47	22	7	27
Tulare	89	58	48	4	37	95
Totals	1,991	409	1,277	*340	393	802

*The 340 animals held for retesting gave doubtful reactions on the occasion of the first test. They were tested a second time, and these tests are included in the 1,991 head of animals tested as indicated in the first column of figures.



Horse in last stages of glanders. Found in a field within 4 miles of Hollister, San Benito County.

SCABIES IN SHEEP.

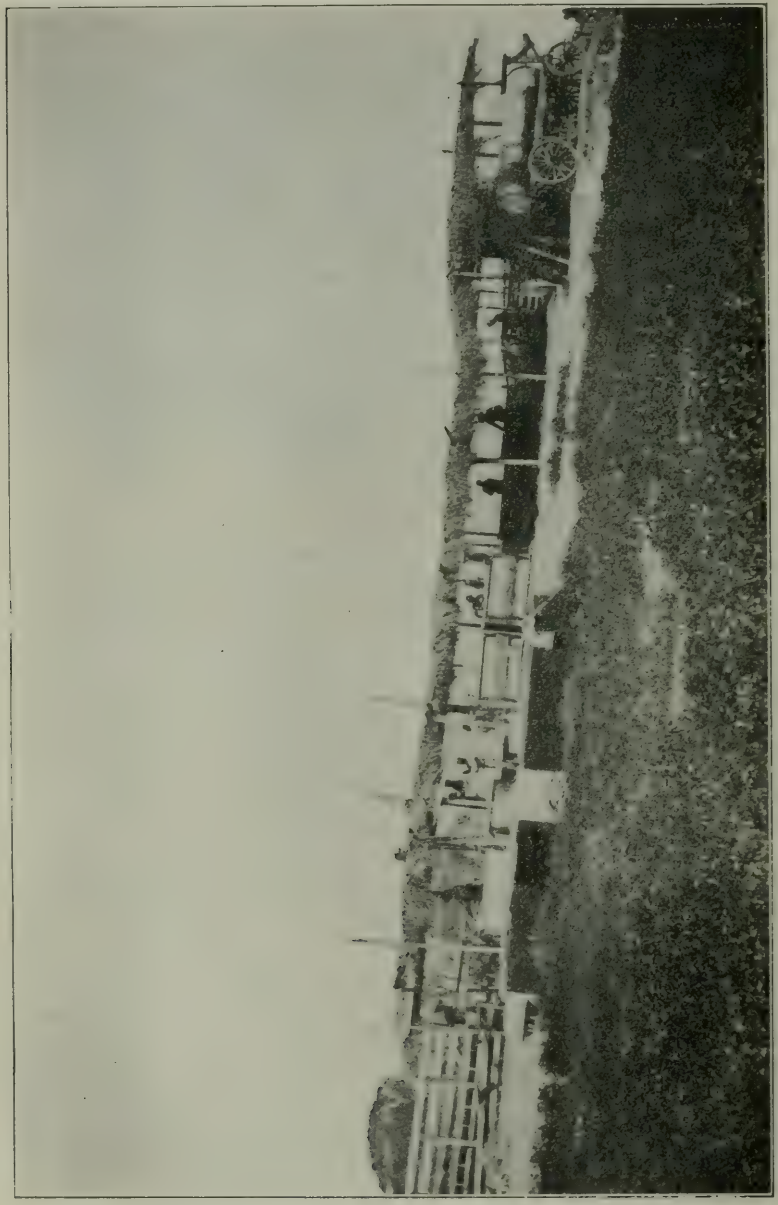
The work of systematic eradication of scabies in sheep, which was inaugurated in March, 1908, has progressed to such an extent that it is only a question of a short time when California sheep will be entirely free from this parasitic disease. When it is taken into consideration that prior to the date on which this work was started practically all of our bands of sheep were more or less infected with scabies, and that the dipping of every band of sheep was officially supervised until at the present writing only isolated foci of infection are found, it can readily be seen what progress has been made in this work. That the result of this work has proved of great benefit to our sheep industry is very apparent to one who was familiar with the conditions that existed several years ago and as they exist to-day.

During the past two years only infected and directly exposed sheep have been dipped. Continual inspections are constantly made by State and Federal inspectors in order to locate as soon as possible any evidences of scabies, and when such sheep are found they are immediately quarantined and dipped under official supervision.

Continued and close inspection of sheep must be made for some time to come. In the driving of sheep to the shearing corrals, and in the annual drives to and from the summer ranges, there is always the danger of spread of scabies if one infected band is overlooked.

The act of February 23, 1909, giving the State Veterinarian authority to seize and dip a band of sheep infected with scabies in case the

owner refused or neglected to do so, has assisted this department greatly in the conduct of this work. Prior to the enactment of this



A large sheep dipping plant located in the San Joaquin Valley.

law our authority was practically limited to quarantine measures. While we have found it necessary to enforce the provisions of this act only in a few instances, in a number of other instances notices to

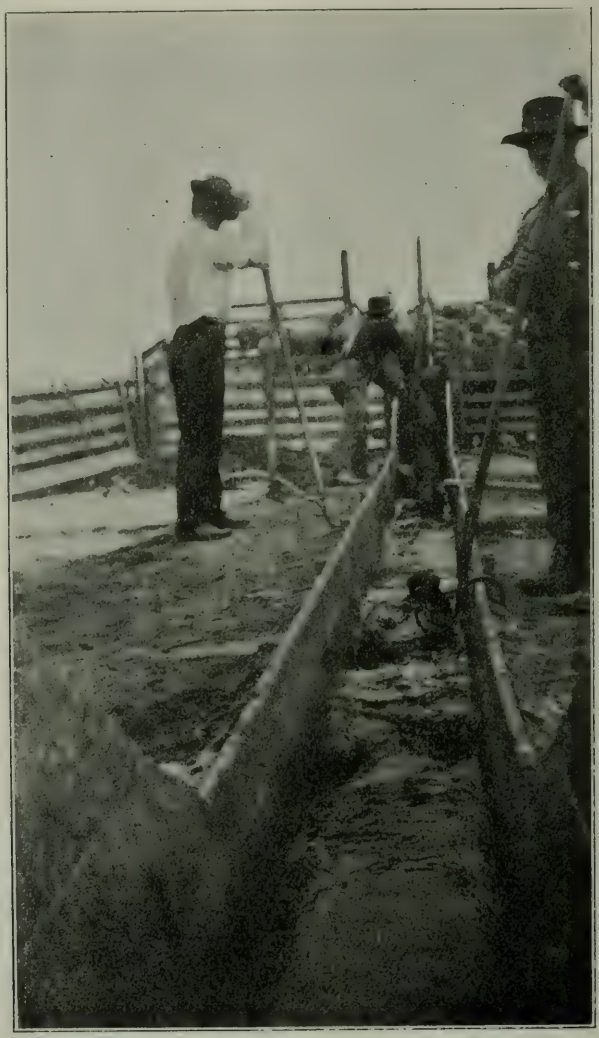
dip sheep have been served by our inspectors under the provisions of the act, with the result that the owners finally consented to comply



Sheep infected with scab, showing loss of wool.

with our instructions before the ten days' notice to dip had expired. In 1909 one band of sheep was seized and dipped in Alameda County, the owner paying the costs of such dipping without the necessity of

the State resorting to the courts. In 1910 another band of sheep was seized and dipped by the State in San Benito County, the expenses of which were paid by the owner of the sheep.



Dipping sheep for the eradication of scabies on a California sheep ranch.

During 1910 two arrests were made in Fresno County for shipping scabby sheep. In one case the guilty party was fined. The other case was dismissed through lack of evidence.

RABIES.

In the fall of 1909 reports were received at this office of dogs with rabies (hydrophobia) in the city of Los Angeles. Later these reports came with alarming frequency, not only from Los Angeles, but also from Pasadena, Stockton, and Riverside. The city veterinarian of Pasadena was requested to remove the heads from rabid dogs, pack same in ice, and send them to the State Hygienic Laboratory for the purpose of having the diagnosis verified by microscopical examination. These examinations were conducted by a veterinarian connected with the Pathological Laboratory of the United States Bureau of Animal Industry who had had considerable laboratory experience with the technique necessary for the laboratory diagnosis of rabies. He was detailed to conduct these examinations by the Chief of the United States Bureau of Animal Industry at the request of the State Veterinarian.

The following is the report made by Dr. Hart of the heads submitted for examination:

"I beg to submit to you the following report of my investigations during the time I was detailed at the California Hygienic Laboratory at Berkeley, Cal., November 18th to December 6, 1909.

The object of the work was to prove or disprove the supposed existence of rabies in the State of California. I arrived at the laboratory on November 19, 1909.

The brains of two dogs (Laboratory Nos. 5 and 6) which had been affected with the suspected disease had arrived that day. They were from Pasadena, Cal., and were forwarded in glycerin by Dr. W. A. Boucher, city veterinarian of Pasadena.

The stain in Mann's method of demonstrating Negri bodies was not in stock in the hygienic laboratory and could not be procured in San Francisco. I was, therefore, obliged to use the alcoholic eosin and methylene blue in Frothinghan's method. In sections of the hippocampus major of dogs Nos. 5 and 6 stained in this manner, suspicious bodies in the nerve cells were found at once, but no preparation sufficiently clear to make a diagnosis could be secured. It was, therefore, requested that the entire head of the suspected cases be forwarded in order that the plexiform ganglia could be removed and the changes of Van Gehuchten and Nelis demonstrated. In response to this request Dr. Boucher forwarded two dogs' heads (Laboratory Nos. 7 and 8), which were received on November 21st. In No. 7 poorly stained Negri bodies and well-marked ganglionic changes were found.

On November 24th two more dogs' heads (Laboratory Nos. 9 and 10) were received from Pasadena, and on the same day the stains in Mann's method for Negri bodies, which had been requested by telegram from the Pathological Division of the Bureau, arrived. With this stain very clear preparations of Negri bodies were found in sections of the hippocampus major of dogs Nos. 5, 6, 7, 9 and 10. The histologic changes in the ganglia were also very typical in dogs 9 and 10, and the diagnosis of rabies was reported to the State Veterinarian, to W. A. Boucher and to Dr. W. M. MacKellar on November 26th.

The brains of dogs (Laboratory Nos. 1, 2, 3 and 4) had been forwarded before my arrival, and Dr. A. R. Ward in charge of the laboratory had inoculated two rabbits subdurally with an emulsion of each of these brains. On November 27th and 28th the rabbits from dogs Nos. 2 and 3 showed symptoms of rabies, and on November 29th both rabbits from dog No. 2 and one from dog No. 3 were dead of the disease. The hippocampi of these experimental animals were removed and Negri bodies demonstrated in both cases.

On November 27th Negri bodies were found in the brain of a dog (Laboratory No. 11) from Los Angeles forwarded by Dr. J. R. Shaw in formaldehyde. On November 29th a dog (Laboratory No. 12) was received from Stockton, Cal., for examination. The microscopic examination of this case was inconclusive, and experimental inoculations were made. Rabbit inoculations had been made in all cases.

however, but after those inoculated by Dr. A. R. Ward developed the disease, it was not considered necessary for me to remain longer, and I left Berkeley on December 4th.

The existence of rabies was demonstrated in eight dogs. This is the first positive finding of the disease in this State, although it has undoubtedly existed here for several months at least, and California will now have to be added to the list of States in which rabies prevails.

Very respectfully,

[Signed.] GEORGE H. HART,
Assistant in Pathology and Bacteriology."

Dr. Hart's examination not only confirmed the physical diagnosis made in Los Angeles, but also a microscopical examination made in the laboratory of the city board of health of that city. Since that time numerous examinations have been made in Los Angeles and in the State Hygienic Laboratory, and in the majority of instances these examinations have been positive.

Not only were reports received at this office of the existence of this disease among dogs, but reports of rabies in human beings, horses and cats were also received. From southern California two deaths in human beings from rabies were reported, one a child and the other an adult.

Reports received from veterinarians in Stockton of rabies in dogs amounted to over 100 cases. Several hundred cases in dogs were reported by veterinarians in the environs of Los Angeles.

As rabies is, under natural conditions, only transmitted from one animal to another, including man, through infected saliva by biting, this department endeavored, in coöperation with the municipal authorities in Stockton, Los Angeles, and Pasadena, to have ordinances enacted requiring the muzzling of all dogs when the animals were not confined on the premises of their owners. Such ordinances were enacted, but were, in the opinion of the writer, repealed too quickly. The nature of the disease, with its variable period of incubation, requires the enforcement of a muzzling ordinance a matter of months before one can be assured with any degree of certainty that the disease is under control. However, the superstition and ignorance in connection with this disease that has been handed down for ages, has resulted in considerable opposition to the muzzling of dogs.

In view of the fact that rabies has now become endemic in California, it might be well to cite in this report, a few facts regarding this disease, especially as we realize there still remain people who are skeptical concerning, and even deny the existence of rabies as a distinct disease.

RABIES (HYDROPHOBIA).

This disease existed and was recognized before the beginning of the Christian era. It was described by Aristotle and other writers. Experiments in the virulence of saliva from rabid animals were first successfully carried out by Zinke in 1804.

The modern study of this disease may be said to date when Pasteur devised his method of subdural inoculations of material from the central nervous system. This method of diagnosis is very certain and is still practiced to-day as a reliable means of settling the diagnosis beyond a doubt.

Rabies was first observed in America in the latter half of the eighteenth century. It appears to have gradually spread from the north Atlantic States, where it was first observed, to the south and west until at the present writing only a few of the Western States appear to be free from this disease.

ANIMALS SUSCEPTIBLE.

Practically all warm blooded animals are susceptible to rabies infection. The disease is more commonly met with, however, in dogs and other members of the canine family. This is of course due to the natural instinct of the dog to bite. While in man only a relatively small number contract rabies after being bitten it would appear that he possesses a certain amount of resistance to the disease. The relatively few cases in man after bites by rabid dogs, can, however, possibly be explained in several ways. In the majority of instances these bites are through the clothes, which to a certain extent prevents the introduction of the infected saliva into the wound. Immediate cauterization of the wound is also universally practiced after dog bites. On the contrary, in dogs very little protection is offered from bites, except by the hair, and little attention is paid to these bites afterwards.

CAUSE OF RABIES.

In practically all cases rabies is caused by the bite of a rabid animal. The rabid dog is the principal source by which rabies is spread. While from the nature of this disease and experimentation, we are assured it is infectious, still the exact nature of the organism is not definitely understood. The incubation period, or the time that elapses between the bite and when the symptoms of rabies appear, is remarkable for its variability. It is seldom that the disease appears in nature before the tenth day, while the longest period may run ten to twelve months. The majority of cases occur, however, before the third month.

SYMPTOMS IN DOGS.

The disease manifests itself in two distinct types in dogs, viz., the furious and the dumb type. A very characteristic early system is a marked and apparently causeless change in the natural disposition of the dog. Pet animals, which were fondled, appear suddenly to become morose and irritable, while those which formerly were naturally irritable may show unusual affection, and desire to be fondled and petted.

The initial symptoms of the rabid dog are restlessness. He is constantly moving. He barks and growls on slight provocation and is easily startled. In the furious type, if the dog is not restrained, he may suddenly leave home and wander off a great distance to return home again in a day or two greatly changed. It is during this wandering period that the rabid dog usually bites people and other animals. While he does not appear to go out of his way to attack men or animals he resents any interference with his movements, and does not hesitate to use his teeth in such resentment. There appears to be hypersensibility of the skin as is evidenced by the animal biting itself. He appears to have no appetite for food, but will frequently bite and swallow indigestible material, such as wood and stones. The act of swallowing becomes difficult, and later in the disease, is impossible.

In the latter stages of the disease convulsions appear and it sometimes happens that death occurs in one. Frequently, however, death occurs from paralysis. The rabid dog finds a secluded place. The lower jaw drops from paralysis of its muscles. The symptoms of paralysis extend until death occurs from paralysis of the centers of respiration.

Another characteristic symptom often noted by those in attendance upon rabid dogs is a change in the character of the voice. Instead of the natural succession of sharp barks there is a hoarse howl followed by an unequal series of barks.

Dumb rabies is distinguished from the furious type by the brevity or complete absence of the stage of excitement. The early symptoms exhibited are those of paralysis of the muscles of deglution (swallowing, and the muscles of the lower jaw).

The common fallacy that rabid dogs are afraid of water, is due to this throat paralysis. While the dog is thirsty it is unable to swallow.

DIAGNOSIS.

This is determined by the symptoms, cause and termination of the disease, microscopical examinations, and inoculation of experimental animals.

While the symptoms and cause of rabies appear to be sufficient for one experienced with this disease to render a diagnosis, it is well to confirm this diagnosis by laboratory methods. This microscopical examination consists in the search of the brain for the microscopical bodies (Negri bodies) discovered by Negri in 1903, and which, when found, are to-day considered as a positive diagnosis. These bodies can only be detected in the brains of animals which are affected with rabies.

Other microscopic lesions have some value in confirming a diagnosis among which might be mentioned the ganglionic changes of Van Gehuchten and Nelis, as well as other minute lesions found by other investigators.

Rabbits inoculated subdurally usually develop the disease by the third week.

SUPPRESSION OF RABIES.

The measures by which rabies can be exterminated are well known. Unfortunately many fallacies regarding this disease have been handed down to us, and its existence is often denied in face of indisputable facts. In some of the European countries little difficulty was experienced in eradicating this disease where suppressive measures were properly administered. The disease does not exist in Australia, and is not likely to be introduced into that country, on account of the quarantine measures in force to prevent its introduction.

As the dog is the natural disseminator of rabies, measures to prevent the dissemination of the disease by these animals, should be adopted and rigidly enforced. Among such measures might be mentioned the destruction of all ownerless dogs, the licensing of all dogs and the muzzling of all dogs when not confined within the premises of their owners.

On account of what we know regarding the variability of the incubation period of rabies, muzzling should be abandoned only after a sufficient time has elapsed, as to warrant a feeling of security that the disease has been eradicated. In the opinion of most observers muzzling should be in force for not less than six months.

ANTHRAX.

This disease has continued to be the cause of severe losses to our live stock during the past two years, as it has been in former years. As long as live stock are run on infected pastures, just as sure will fatalities occur from this disease. Once infected a pasture remains infected indefinitely, and as soon as the feed in such a pasture becomes short, animals start to die. This is probably due to the fact that infection exists close to the grass roots. This fact is so well recognized on some of our larger beef ranges, on which in former years anthrax was the cause of severe losses, that the infected range is not allowed to be fed off too close. The cattle are taken off early and only put back after a new growth of feed appears.

On many of the smaller ranches this procedure can not be carried out on account of lack of feed. On these places, in most instances, preventive vaccination is attempted with variable results. In some instances cattle continue to die after vaccination, while in others vaccination when properly performed, appears to check the progress of the disease.

Anthrax is a very serious disease, especially when it occurs in a dairy herd. It is directly communicable to man, who may possibly become infected through the milk from an infected cow. The disease appears

very suddenly as a rule, one or more cows being found dead which a short time previous were apparently enjoying good health. While any disease in a milch cow that causes a high fever will eventually suppress milk secretion, there is a period, however, during the early stages of the disease during which milk is secreted. Grave danger exists if such milk is used for human consumption. On account of the virulence of this disease and its suddenness in attack, measures are adopted by this department to prohibit the use for any purpose of milk from any cows in a dairy where anthrax exists. Such milk is ordered destroyed immediately after milking, and until such a time as it would appear that the disease has abated.

During August and September of 1909 serious outbreaks of anthrax occurred among the cows in four dairies in Solano County. Two hundred and three cows died from this disease in these four dairies in the course of about two weeks.

The following reports of outbreaks of anthrax were investigated by this department during the past two years: Kings County, on three ranches; Merced County, on four ranches; San Benito County, on three ranches; Stanislaus County, on one ranch; Kern County, on one ranch; Contra Costa County, on six ranches; Glenn County, on one ranch; Colusa County, on one ranch; Solano County, on seven ranches; Yolo County, on two ranches; Inyo County, on eleven ranches; Monterey County, on three ranches; Tehama County, on five ranches; Sacramento County, on two ranches; San Joaquin County, on one ranch; Sonoma County, on one ranch.

The above does not come near representing the outbreaks of anthrax during the past two years. In many instances deaths among live stock due to anthrax occur on the ranges along our large river courses and no notification is received at this office regarding same.

HOG CHOLERA.

Numerous reports of deaths in hogs from cholera were received and investigated by this office. In the following counties the losses from this disease were quite extensive: San Luis Obispo, Fresno, Los Angeles, Mendocino, Kings, Tehama, Santa Cruz, San Joaquin, Tulare, Santa Clara, Monterey, Merced, Colusa, and Shasta. Hog cholera is, however, pretty well distributed throughout the hog raising sections of this State, and acts not only as a menace to hog raising, but also prevents the natural development of this important industry. California is particularly adapted for the raising of hogs. The large areas in this State which have in the past few years been turned into dairies through the development of irrigation, offer an excellent field for the production of pork. The by-products from these dairies, as well as the class of feed that can be grown under the system of irriga-

tion, insures the production of pork at a relatively low cost. To what extent hog raising can be reached in California, is only limited by the protection that can be afforded hog raisers against the ravages from hog cholera.

At the present time we raise a very small part of the pork that is consumed in this State. Nearly all of our pork is brought into California in refrigerator cars in sweet pickle from the packing centers of the Middle West. For fresh pork many car loads of hogs are purchased by California packers in other states and hauled out here for slaughter. Why this condition should exist in an agricultural state like California, where every facility exists for hog raising, sufficient to supply at least our own consumption of pork, is undoubtedly due, in the opinion of the writer, to the fact that a hog breeder is afraid to take chances with cholera decimating his herd. This opinion is shared by many others in this State. The deaths from this disease are so rapid that under present conditions in California it spreads rapidly from one animal to another until in a very short time practically the entire herd is dead.

At the present time in California our only means of fighting against the ravages of cholera is by the ordinary sanitary procedure. We supervise the cleaning and disinfection of premises where the disease exists, cremation of carcasses, and advise the dipping of all contact hogs in a disinfectant.

In the fourth biennial report of this department I called attention to a new method of preventive vaccination against cholera in hogs, as adopted and discovered by the Bureau of Animal Industry, United States Department of Agriculture. The Department of Agriculture has patented this process in such a manner as to insure all the people of this country the right to its free use. The department, however, does not distribute this serum to the states or to hog raisers. The various states are expected, if they wish to protect their hog industry by this method, to prepare and distribute this serum.

METHOD OF SECURING IMMUNE SERUM.*

Without attempting to go into the method of producing this serum in detail, it will be sufficient to say that the protective serum is produced by a process of "hyperimmunization" carried out as follows: An immune hog is injected with large amounts of blood from hogs sick of hog cholera. These injections will not produce more than a transitory effect upon the health of the immune, although they would prove certainly fatal to a susceptible hog. This treatment of immune hogs with large amounts of disease-producing blood is known as "hyperim-

*Excerpt from a paper read by Dr. A. D. Melvin, Chief of the U. S. Bureau of Animal Industry, at the forty-fifth annual meeting of the American Veterinary Medical Association.

munization," and gives to the blood of the immune the power to protect susceptible hogs from hog cholera. After a week or so, when the immune has recovered from the effects of this treatment, blood is drawn from the immune by cutting off the tail. The blood-drawing is repeated three or four times, at intervals of a week between the drawings, after which the immune is usually bled to death from the carotid. After each drawing from the immune the blood obtained is defibrinated and mixed with a suitable antiseptic. If preserved in sterile bottles this defibrinated blood, or serum, as it is called, will retain its potency for years.

The protective serum having been obtained from an immune hog in the manner indicated, the potency of this serum is determined by injecting susceptible pigs with varying amounts of the serum and at the same time exposing them to hog cholera along with untreated control animals. In practice it will of course be found best to first collect large quantities of serum and to mix these before testing. A standard serum will thus be secured at a minimum cost.

METHOD OF PROTECTING SUSCEPTIBLE PIGS.

A standard serum of known potency having been secured, either of two methods may be used for protecting susceptible pigs. These are known as (*a*) the serum-simultaneous method, and (*b*) the serum-alone method.

The first of these, which is to be recommended for use especially in herds which have not been exposed to hog cholera, consists in injecting subcutaneously on one side of the body of the pig to be vaccinated a suitable quantity of serum and simultaneously on the other side of the body a small quantity of virulent blood taken from a hog sick of hog cholera. Experiments have shown that by this method pigs are given a firm immunity, lasting at least six months and probably much longer.

The "serum-alone method," which consists simply in the injection of the protective serum without the simultaneous use of disease-producing blood, appears to confer only a temporary immunity upon the treated pigs, unless they be exposed to hog cholera a short time after receiving the serum, in which case they also acquire a lasting immunity. For these reasons the "serum-alone method" is admirably adapted to the treatment of hogs in a herd where hog cholera has already broken out, but which have not themselves shown visible symptoms of disease.

The experiments which are being carried out to determine the curative properties of the serum are not yet complete, but from the results thus far obtained we know that serum in the doses used for immunization can not be depended upon to cure hogs which already show visible

symptoms of hog cholera. Further work along this line is needed. It should be stated that neither the serum-simultaneous nor the serum-alone method, when properly applied, appears to injure the hog in any way.

COST OF THE SERUM.

In order to determine the cost of producing serum for practical use every item of cost would, of course, have to be taken into account and allowance made for all sources of revenue. Owing to the conditions under which we have been working, that is, manufacturing serum for experimental use only, and utilizing the same force for the production of the serum and for carrying on varied experiments, we are unable to give an exact cost price of the serum thus far produced. Sufficient work has been done, however, for an estimate to be made. With the dose of serum at 20 cubic centimeters, and with the production carried out with strict economy, it seems likely that the cost per dose can be brought to 25 cents. This estimate is based upon the supposition that each hyperimmunized immune will furnish 150 to 200 doses of serum, and that the carcass of the immune after final bleeding, will be utilized for food. There seems to be no objection to the use of such a carcass for food purposes, provided the post-mortem examination discloses no reason for rejecting it.

I have recently been informed by Dr. C. E. Marshall, of the Michigan Agricultural College, who has begun the production of this serum for distribution to farmers of that state, that it is their purpose to charge at present 2 cents per cubic centimeter for the serum, though they hope to be able to reduce the price materially before another season. It will undoubtedly prove to be true that the serum cost will vary with the conditions of manufacture, and the proportionate cost should decrease as the amount of serum produced increases.

In any case it seems certain that the serum can be produced cheaply enough for practical purposes.

RESULTS OF PRACTICAL TESTS OF THE SERUM.

The statements which have been made above concerning the protective power of serum from hyperimmunized immunes are based upon tests upon several thousand hogs, and these tests were not carried out in small experiment pens only but in great part upon farms under practical conditions. During the fall of 1907 approximately 2,000 hogs were treated on fifty different farms, a considerable proportion of untreated hogs being left in all cases as a control on the action of the serum. Both methods of vaccination were used and the herd conditions varied widely. The herds can be roughly classified as (*a*) those in an infected district but themselves free from disease; (*b*) those which were known to have been exposed by contact with sick hogs but

which had not developed disease at the time of treatment, and (*c*) herds in which hog cholera was present and hogs sick and dying at the time of treatment.

In no cases were any of the ordinary methods of combating hog cholera by disinfection and separation of the sick from the apparently healthy practiced. Where disease was present at the time of treatment, the treated were allowed to run with the sick animals along with a number of untreated animals which served as controls, and the success following vaccination can therefore be attributed to the action of the serum. In the herds where hog cholera appeared subsequent to treatment, all of the vaccinated hogs remained well, while more than 65 per cent of the checks died. In the herds which had been exposed but were apparently well at the time of treatment 4 per cent of the treated animals died, while approximately 90 per cent of the checks succumbed. In the herds where disease existed at the time of treatment, and where we did not anticipate very great success, 13 per cent of the treated animals were lost, whereas 75 per cent of the checks died.

These successful field trials, confirming as they did numerous tests carried out under experimental conditions, have convinced us of the efficiency of the method of dealing with hog cholera; and although improvements will undoubtedly be made in many of the details of producing the serum, the method is believed to be now in such condition as to make the practical use of it entirely feasible.

In order that the states most concerned in this question might be brought into closer touch with the work, and also for the purpose of discussing plans for effective coördination of the State and Federal work in dealing with hog cholera, twenty-five of the chief hog raising states were requested to send representatives to Ames, Iowa, where the Bureau of Animal Industry maintains a farm devoted to experiments with hog cholera. In response to this invitation representatives from twenty different states visited Ames and were shown the details of the serum production.

A general discussion at these conferences developed the practically unanimous opinion on the part of State and Federal representatives that the serum should be prepared by each of the states for distribution to the hog raisers, and all State representatives expressed their intention to undertake the work as soon as funds could be secured. At the present time a number of states have actually begun work. If the serum is prepared in sufficient quantities, there seems to be no doubt that a great saving can be effected simply by treating animals in exposed herds, or in herds in which the disease has just appeared; if the greatest good is to be accomplished, however, we should not be content simply to reduce the losses from hog cholera, but should under-

take systematic efforts to eradicate the disease. We are all familiar with the course which hog cholera usually takes when it appears in a neighborhood. A herd develops the disease which may not be recognized as hog cholera for several weeks after it has made its appearance. Following this the neighbors' hogs will become infected, and from there rapid progress is made, the number of new foci increasing more rapidly as the infected area widens, until finally the losses in a single county may be enormous.

It is evident that in order to control the disease there must be some means of confining it to the original center of infection. This has been attempted by the British Government through the quarantine of farms where hog cholera exists, and the slaughter of all infected animals. That such procedure alone will not yield the desired results is shown by the official reports of the prevalence of hog cholera in England.

In this country such methods would not be suitable, for, aside from the enormous expense involved, it would in my opinion be entirely impracticable to thoroughly disinfect extensive farm premises and to carry out a quarantine which would be effective against such carriers of disease as dogs, crows, buzzards, and other animals.

While the production of this serum appears to be a very simple process, suitable buildings and equipment are necessary, including a laboratory. The experience of officials in several of the states in the Middle West, engaged in the production of anti-hog cholera serum, has shown that the cost of production is about 30 cents for an average dose. The plan adopted by these states is to provide proper equipment and help and supply the serum to hog raisers at the cost of production.

By the establishment of such a plan in this State, our hog industry would not only receive the protection it requires, but it would also be built up to that stage where in time it would become a very profitable business.

BLACK LEG (SYMPTOMATIC ANTHRAX).

This disease, which affects young cattle, is prevalent to a greater or less extent throughout our cattle raising sections. It is easily controlled, however, by preventive vaccination, which is universally practiced by cattle raisers. A number of outbreaks were reported to this department by cattle raisers who were ignorant of the nature of the disease. These reports were investigated and the nature of the diseased established, and preventive vaccination was resorted to with the result that the disease was checked. Cattle raisers are advised by this department, when once the disease appears in the herd, to annually vaccinate their young stock.

FORAGE POISONING IN HORSES AND MULES.

The losses from this affection in several sections of the State were very serious. This affection was investigated and relief afforded in Siskiyou, Santa Clara, San Joaquin, and Fresno counties. It is due to the eating of spoiled or mouldy fodder, and is very fatal to horses and mules. The affection has in the past been frequently diagnosed as epizootic cerebrospinal meningitis, by reason of the fact that there is an involvement of the central nervous system as is evidenced by the train of symptoms. The affection is easily prevented by a complete change of the animals to bright, clean fodder.

TUBERCULOSIS.

In the last biennial report of this department I drew attention to the fact that tuberculosis among hogs in California was increasing to an alarming extent. The reports received at this office during the past two years from the Federal meat inspectors of tuberculosis found in hogs at official abattoirs were very numerous. That hogs contract this disease from tubercular cattle there is no question of doubt. Experimental and clinical evidence conclusively proves this fact.

Tuberculosis is a highly infectious disease and prevails to an alarming extent among the dairy cows of California. This fact is generally admitted by our most progressive dairymen and cattle breeders. In fact, the most universal prevalence of this disease among dairy stock is the principal argument presented against measures that may be adopted for its suppression. However, some plan should be adopted by this State looking towards the ultimate suppression of this disease. Tuberculosis is constantly spreading among cattle and hogs, and it is only a question of time when the public will demand that measures be taken to cope with this disease.

This subject has a public health as well as an economical interest. The fact is well established that man can contract tuberculosis from the ingestion of milk or meat from infected cows; and tuberculosis, studied from an economical view-point is the cause of severe losses to our cattle and hog industries. It not only shortens the lives of cows, but unquestionably reduces the efficiency of the herd as a machine for producing milk. The disease is also very prevalent among the cattle on some of our beef ranges. It is the cause of death on the ranges, and severe losses are experienced through the condemnation of carcasses in official abattoirs by Federal inspectors.

The control of tuberculosis in animals is a state problem. It has been attempted by municipalities in California in the enactment of ordinances for the improvement of milk supply without much success in any instance. The State should endeavor by adequate legislation to ascertain in what herds this disease exists, and on gaining this infor-

mation the tuberculous animals should be segregated from the balance of the herd. At the present time the only practical method of obtaining this information is by the application of the tuberculin test to all dairy cattle in the State of California.

In order to guard against its illicit use, legislation should be enacted regulating the sale of tuberculin, and persons who intend to use the same should be required to obtain permits from the authorities charged with the control of animal diseases. Legislation of this nature would be imperative if any attempt should be made by the State to segregate the infected from the healthy animals. The practice of plugging, or in other words, the injection of tuberculin into a cow a short time before the inspector comes around to make the test is pretty well understood. Under such circumstances a tuberculosis cow will not react to tuberculin for some time, having by the first injection developed a toxic immunity to same.

The states of Kansas, Wisconsin, and New York have enacted legislation regulating the use of tuberculin and requiring persons who intend to use the same to obtain permits from the authorities charged with the control of animal diseases.

The writer fully realizes the magnitude of the work of suppressing tuberculosis in our cattle herds. The work should be started, however, and the proper authorities should be supplied with adequate facilities and wise legislation in order to carry on this most important work.

LABORATORY REQUIREMENTS.

This department has got along as best it could since its establishment by the legislature of 1899 without any laboratory assistance. The modern study of communicable diseases of animals, having for its principal object the control and eradication of these diseases is accomplished both in the field and in the laboratory. One is a necessary adjunct to the other. The need of such a laboratory in connection with this department is felt. No department charged with the control and eradication of infectious diseases can be expected to do effective work without such a laboratory. In addition to the investigation of diseases, this laboratory could prepare and distribute hog cholera serum as indicated by my remarks on that subject.

I would, therefore, recommend the establishment of such a laboratory, and the creation of the position of veterinary bacteriologist and pathologist in connection with this department.

SOUTHERN CATTLE FEVER QUARANTINE REGULATIONS ISSUED DURING THE SIXTIETH AND SIXTY-FIRST FISCAL YEARS.

STATE OF CALIFORNIA,
OFFICE OF STATE VETERINARIAN.

PROCLAMATION.

EXECUTIVE DEPARTMENT, STATE OF CALIFORNIA,
SACRAMENTO, CAL., June 14, 1909.

WHEREAS, The State Veterinarian of the State of California has ascertained that cattle located in certain counties in the State of California hereinafter named are liable to communicate an infectious disease known as Texas, splenetic or Southern fever, to cattle located in other counties in the State of California should said cattle located in the counties hereinafter named be shipped, moved, transported, driven or grazed over the lands situated in other counties in the State of California; and,

WHEREAS, Under and by virtue of an act of the legislature of the State of California, entitled "An act to protect domestic live stock from contagious and infectious diseases, to provide for the appointment and duties of officials to carry into effect the provisions of this act, and to provide an appropriation therefor," which became a law March 18, 1899, and as amended March 20, 1905, and March 23, 1907, and as further amended March 19, 1909, the State Veterinarian of the State of California, in order to prevent the spreading or communication of said disease of Texas, splenetic or Southern fever in cattle, has, on this fourteenth day of June, 1909, quarantined the following counties and parts of counties in the State of California: San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Tulare, and Kings; and that part of Fresno county situated west of the east side line of the Southern Pacific Railroad; and those parts of San Bernardino and Riverside counties situated west of the one hundred and sixteenth meridian, west longitude.

WHEREAS, The State Veterinarian has, on this fourteenth day of June, 1909, made and established the following rules and regulations as to the movements of cattle from said counties and parts of counties into other counties or sections in the State of California, or from any one of the counties or parts of counties herein mentioned to any of the other counties or parts of counties herein mentioned.

From and after this fourteenth day of June, 1909, every person, company, corporation, their agents and servants, are hereby prohibited from driving, leading, moving, carrying or transporting, or from causing or permitting to be driven, led, moved, transported, carried or drifted into any other county or section in the State of California, or from any one of the counties or parts of counties herein mentioned, to any of the other counties or parts of counties herein mentioned, any cattle originating or being in the following named counties and parts of counties: San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Tulare, and Kings; and that part of Fresno county situated west of the east side line of the Southern Pacific Railroad; and those parts of San Bernardino and Riverside counties situated west of the one hundred and sixteenth meridian, west longitude, unless such cattle have first been inspected by the State Veterinarian or his duly authorized deputy and are accompanied by a certificate issued by such officer stating that said cattle are free from contagious and infectious diseases and cattle ticks (*Margaropus annulatus*); *provided, however*, that when said cattle are shipped or transported on railroad trains for immediate slaughter to the following named cities in the State of California: San Francisco, Oakland, Los Angeles, and San Diego, inspection and certification of such cattle will not be required, but when so shipped or transported by railroad the following regulations must be observed.

On unloading said cattle at their destination, or for food and rest en route to same, separate pens must be set apart to receive them and no other cattle shall be admitted to said pens. The cars that have carried said cattle shall be cleaned and disinfected before they are again used to transport, store or shelter animals or merchandise.

All cars carrying said cattle shall bear placards stating that said cars contain "Southern cattle," and each of the way bills of said shipments shall have a note on its face with a similar statement.

The cars used to transport such cattle shall be cleaned and disinfected in the following manner:

(*a*) Remove all litter and manure. This litter and manure must be stored where no cattle can come into contact with it for a period of at least eight months.

(*b*) Wash the cars with water until clean.

(*c*) Saturate the entire inner surface of the cars, including the inner surface of the car doors, with a mixture made of one and one-half pounds of lime and one-quarter pound of pure carbolic acid to each gallon of water; or with a solution made by dissolving four ounces of chloride of lime to each gallon of water.

It is further ordered that a violation of any or either of the foregoing rules and regulations shall be an offense, and punishable as provided by the laws of the State of California.

Now, therefore, I, J. N. Gillett, as Governor of the State of California, by virtue of the authority vested in me by law, do hereby proclaim the counties and parts of counties named in this proclamation quarantined within the State of California, and further hereby proclaim the foregoing rules and regulations prescribed by the State Veterinarian for the maintenance and enforcement of such quarantine to be legal and binding rules and regulations within the State of California, and I do further proclaim that said rules and regulations shall be maintained and enforced within the State of California, and that a violation thereof shall subject all persons so violating any of said rules or regulations to the penalties provided for in section eight of that said act of the legislature entitled "An act to protect domestic live stock from contagious and infectious diseases, to provide for the appointment and duties of officials to carry into effect the provisions of this act, and to provide an appropriation therefor."

In witness whereof, I have hereunto set my hand and caused the Great Seal of this State to be hereunto affixed, this fourteenth day of June, A. D. 1909.

[Signed] J. N. GILLETT,
Governor of the State of California.

Attest:
[Signed] C. F. CURRY,
Secretary of State.

[SEAL]

STATE OF CALIFORNIA.
OFFICE OF STATE VETERINARIAN.

PROCLAMATION.

EXECUTIVE DEPARTMENT, STATE OF CALIFORNIA,
SACRAMENTO, CAL., March 1, 1910.

WHEREAS, The fact has been determined by the Secretary of the United States Department of Agriculture that an infectious disease known as splenetic, Southern or Texas fever, exists among cattle in the following named states, to wit: Oklahoma, Texas, Missouri, Arkansas, Louisiana, Mississippi, Tennessee, Alabama, Virginia, North Carolina, South Carolina, Georgia, and Florida; and,

WHEREAS, Under and by virtue of an act of the legislature of the State of California, entitled "An act to protect domestic live stock from contagious and infectious diseases, to provide for the appointment and duties of officials to carry into effect the provisions of this act, and to provide an appropriation therefor," which became a law March 18, 1899, and as amended March 20, 1905, and March 23, 1907, and as further amended and approved March 19, 1909, the State Veterinarian of the State of California, in order to prevent the spreading or communication of said disease of splenetic, Southern or Texas fever to cattle within the State of California, should cattle from the aforesaid states be imported into the State of California, has, on this first day of March, 1910, made and established the following rules and regulations as to the importations of cattle from the aforesaid states:

From and after this first day of March, 1910, every person, company, corporation, their agents and servants, are hereby prohibited from bringing into the State of California any cattle originating or being in that area of territory in the United States south of the Federal quarantine line which has been or may be established

by the United States Department of Agriculture, or any cattle infested with the *Margaropus annulatus* tick, except in accordance with the regulations of the United States Department of Agriculture, or except when said cattle are shipped or transported on railroad trains for immediate slaughter, and when so shipped or transported by railroad, the following regulations must be observed:

On unloading said cattle at their destination, or for food and rest en route to same, separate pens must be set apart to receive them and no other cattle shall be admitted to said pens. The cars that have carried said cattle shall be cleaned and disinfected before they are again used to transport, store or shelter animals or merchandise.

All cars carrying said cattle shall bear placards stating that said cars contain "SOUTHERN CATTLE," and each of the way bills of said shipments shall have a note on its face with a similar statement.

The cars used to transport such cattle shall be cleaned and disinfected in the following manner:

(*a*) Remove all litter and manure. This litter and manure must be stored where no cattle can come into contact with it for a period of at least eight months.

(*b*) Wash the cars with water until clean.

(*c*) Saturate the entire inner surface of the cars, including the inner surface of the car doors, with a mixture made of one and one-half pounds of lime and one-quarter pound of pure carbolic acid to each gallon of water; or with a solution made by dissolving four ounces of chloride of lime to each gallon of water.

It is further ordered that violation of any or either of the foregoing rules and regulations shall be an offense, and punishable as provided by the laws of the State of California.

Now, therefore, I, J. N. Gillett, as Governor of the State of California, by virtue of the authority vested in me by law, do hereby proclaim the foregoing rules and regulations prescribed by the State Veterinarian to be legal and binding rules and regulations within the State of California, and I do further proclaim that said rules and regulations shall be maintained and enforced within the State of California, and that a violation thereof shall subject all persons so violating any of said rules or regulations to the penalties provided for in section eight of that said act of the legislature of the State of California enitled, "An act to protect domestic live stock from contagious and infectious diseases, to provide for the appointment and duties of officials to carry into effect the provisions of this act, and to provide an appropriation therefor."

In witness whereof, I have hereunto set my hand and caused the Great Seal of this State to be hereunto affixed, this first day of March, A. D. 1910.

[Signed.] J. N. GILLETT,
Governor of the State of California.

Attest:
[Signed.] C. F. CURRY,
Secretary of State.

[SEAL.]

STATE OF CALIFORNIA,
OFFICE OF STATE VETERINARIAN,
SACRAMENTO.

PROCLAMATION.

EXECUTIVE DEPARTMENT, STATE OF CALIFORNIA,
SACRAMENTO, CAL., March 1, 1910.

WHEREAS, The State Veterinarian of the State of California has ascertained that cattle located in certain counties and portions of counties in the State of California hereinafter named are liable to communicate an infectious disease known as Texas, splenetic or Southern fever, to cattle located in other counties and portions of counties in the State of California should said cattle located in the counties and portions of counties hereinafter named be shipped, moved, transported, driven, or grazed over the lands situated in other counties and portions of counties in the State of California; and

WHEREAS, Under and by virtue of an act of the legislature of the State of California, entitled "An act to protect domestic live stock from contagious and infectious diseases, to provide for the appointment and duties of officials to carry into effect the provisions of this act, and to provide an appropriation therefor," which became a law March 18, 1899, and as amended March 20, 1905, and March 23, 1907, and as

further amended and approved March 19, 1909, the State Veterinarian of the State of California, in order to prevent the spreading or communication of said disease of Texas, splenetic or Southern fever, has, on this first day of March, 1910, quarantined the following counties and portions of counties in the State of California:

The entire county of San Diego.

The entire county of Orange.

The entire county of Santa Barbara.

All that portion of San Luis Obispo County lying west and south of a line commencing at the point of the intersection of the township line between township 32 south, range 17 east, and 32 south, range 18 east, and the Santa Maria River on the southern boundary of the county of San Luis Obispo, and extending northerly on said township line between townships 32 south, range 17 east, 32 south, range 18 east, and 31 south, range 17 east, and 31 south, range 18 east, to its intersection with the summit of the Santa Lucia range of mountains; thence following the summit of the Santa Lucia range of mountains northerly and northwesterly to its intersection with the northerly boundary line of San Luis Obispo County.

All that portion of Fresno County situated within township 17 south, range 20 east.

All that portion of Kings County situated in township 20 south, range 22 east.

All that portion of Tulare County situated in townships 21 south, range 27 east and 22 south, range 27 east.

All that portion of San Bernardino County located in the following townships: 9 north, 1 west; 9 north, 1 east; 9 north, 2 east; 10 north, 2 east; 10 north, 3 east; and 10 north, 4 east; and

WHEREAS, The State Veterinarian has, on this first day of March, 1910, made and established the following rules and regulations as to the movements of cattle from said quarantined counties and portions of quarantined counties into other counties or portions of counties in the State of California:

From and after this first day of March, 1910, every person, company, corporation, their agents and servants, are hereby prohibited from driving, leading, moving, carrying or transporting or from causing or permitting to be driven, led, moved, transported, carried or drifted into any other county or portion of county in the the State of Califonia, any cattle originating or being in the aforesaid quarantined counties and portions of counties, unless such cattle have first been inspected by the State Veterinarian or his duly authorized deputy and are accompanied by a certificate issued by such officer stating that said cattle are free from contagious and infectious diseases and cattle ticks (*Margaropus annulatus*); *provided, however*, that when said cattle are shipped or transported on railroad trains for immediate slaughter inspection and certification of such cattle will not be required, but that when so shipped or transported by railroad the following regulations must be observed:

On unloading said cattle at their destination, or for food and rest en route to same, separate pens must be set apart to receive them and no other cattle shall be admitted to said pens. The cars that have carried said cattle shall be cleaned and disinfected before they are again used to transport, store or shelter animals or merchandise.

All cars carrying said cattle shall bear placards stating that said cars contain "SOUTHERN CATTLE," and each of the way bills of said shipments shall have a note on its face with a similar statement.

The cars used to transport such cattle shall be cleaned and disinfected in the following manner:

(*a*) Remove all litter and manure. This litter and manure must be stored where no cattle can come into contact with it for a period of at least eight months.

(*b*) Wash the cars with water until clean.

(*c*) Saturate the entire inner surfaces of the cars, including the inner surface of the car doors, with a mixture made of one and one-half pounds of lime and one quarter pound of pure carbolic acid to each gallon of water; or with a solution made by dissolving four ounces of chloride of lime to each gallon of water.

It is further ordered that a violation of any or either of the foregoing rules and regulations shall be an offense, and punishable as provided by the laws of the State of California.

Now, therefore, I. J. N. Gillett, as Governor of the State of California, by virtue of the authority vested in me by law, do hereby proclaim the counties and portions of counties named in this proclamation quarantined within the State of California, and further hereby proclaim the foregoing rules and regulations prescribed by the

State Veterinarian for the maintenance and enforcement of such quarantine to be legal and binding rules and regulations within the State of California, and I do further proclaim that said rules and regulations shall be maintained and enforced within the State of California, and that a violation thereof shall subject all persons so violating any of said rules or regulations to the penalties provided for in section eight of that said act of the legislature of the State of California entitled, "An act to protect domestic live stock from contagious and infectious diseases, to provide for the appointment and duties of officials to carry into effect the provisions of this act, and to provide an appropriation therefor."

In witness whereof, I have hereunto set my hand and caused the Great Seal of this State to be hereunto affixed, this first day of March, A. D. 1910.

[Signed.] J. N. GILLETT,
Governor of the State of California.

Attest:
[Signed.] C. F. CURRY.
Secretary of State.

[SEAL.]

THIRD BIENNIAL REPORT

OF THE

STATE FORESTER

OF THE

STATE OF CALIFORNIA

G. M. HOMANS - - - - - - - - State Forester



SACRAMENTO:
W. W. SHANNON - - - - - - - - - - Superintendent State Printing
1910.

CALIFORNIA STATE BOARD OF FORESTRY.

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OFFICE OF STATE FORESTER.

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LETTER OF TRANSMITTAL.

STATE FORESTER'S OFFICE,

SACRAMENTO, CALIFORNIA, November 18, 1910.

His Excellency, JAMES N. GILLETT, *Governor of California.*

SIR: I have the honor to transmit herewith a report entitled "Third Biennial Report of the State Forester of the State of California."

Very respectfully,

G. M. HOMANS,
State Forester.



Chaparral Fire.

Such fires destroy the watersheds, reduce the water supply, and make reforestation most difficult. These conditions will continue until an adequate appropriation for fire protection is made. Timber owners should assist by forming fire associations.

INTRODUCTION.

This report is, in the final analysis, an argument to show why the appropriation for this office should be increased from $40,300.00, as at present, to $122,600.00. So large an increase naturally requires full explanation, and to furnish this in logical sequence is the aim of the report. It therefore begins with a general description of forest conditions as they exist in the State, shows what changes in present conditions are necessary or desirable, and how they may be effected by an increased appropriation, and ends with a detailed discussion of the state forest laws and recommendations regarding their amendment.

There are about 30,000 square miles of forested land within the State. The stand of timber on this area is estimated at nearly 300 billion feet, board measure, with a stumpage value of approximately $700,000,000 and a manufactural value of at least six times as much. Each year the lumber industry of the State puts more than $20,000,000 into circulation. Here surely is an enormous asset which under improper treatment will rapidly disappear, but which properly handled will last for all time. If this office, by an expenditure of the amount asked for, can help to preserve this asset it certainly deserves assistance; and a study of the following pages will show how it proposes to do so.

It may be argued that the Federal Government has set aside 27 million acres of forest in California, which it manages so as to insure permanent returns, and that further action by the State would be superfluous. This is very far from being the case. The figure given above, although the one generally reported, is misleading, for it comprises the total area included within the boundaries of the national forests and not the area actually forested or actually owned by the Government and subject to the Federal regulations. Of the 27 million acres mentioned a very considerable proportion, especially in southern California, consists of brush without forests, and a large part of the remainder belongs to private individuals over whose holdings the Government has no control. The private forests not only occupy nearly as large an area as the national forests, but they are far more valuable because they naturally contain the pick of the timber. The Government claims at present about 11 million acres of forest with a stand of 98 billion feet B. M. of timber worth on the stump about 190 million dollars. Private holdings, however, amount to 8½ million acres and contain 175 billion feet B. M., worth more than 500 million dollars.

If forestry methods are advisable on the Government lands they are, for so much the stronger reason, advisable on the lands privately owned. The problem, however, is quite different in the two cases. With the Government it is not a question, as yet, of making a profit from timber operations, whereas with the private owner it is. Therefore, if the private owner of timber land is to take up forestry methods voluntarily, he must first be supplied with much more detailed information regarding rates of growth, yield, etc., than the Government requires. This information it should be the business of this office to gather and publish.

For improvements in logging methods must come gradually as they are found to be practical. We do not propose to urge any remedy until quite sure it will work. Thus, for example, one of the first questions a yellow pine logger would raise would be as to the size of the tree which can be left to grow more profitably than it can be sawed into lumber. This question can be answered satisfactorily after taking many measurements and making calculations. It might, of course, be possible to guess at the answer and by stirring up public sentiment to get an act through the legislature prohibiting the cutting of smaller trees. There is little doubt that such an act would be constitutional. The question is, would it be advisable, and it must be answered that under present conditions it would not; and that, furthermore, if the office is given the opportunity to obtain the preliminary information, it would be quite unnecessary. For such information would undoubtedly prove to the lumberman that the present practice of skinning the land is unprofitable for him, and he would adopt more conservative methods voluntarily. But first we must get the facts and figures, and hampered as we are by forest fire work throughout the field season, we have no opportunity. The system of state and county coöperation outlined in the report would work almost automatically after it was once installed, and would leave this office free to do the other important work it has to do.

Much of the report is devoted to the subject of forest fires. This subject has thus been given prominence, not because it is in itself the most important forest topic, but because the solution of the fire problem naturally precedes the consideration of all other forest problems. Without protection from fire, planting of course would be impossible, and the benefit of applying practical forestry principles to the management of virgin forests would be small. That is, it would do no good to establish a new forest, either by planting or by the conservative cutting of the mature forest, unless there were a reasonable prospect of the young stand reaching maturity. The following pages show very conclusively that the fire danger can only be prevented by more systematic and painstaking efforts than have hitherto been possible, and it is greatly to be

hoped that the arguments used for the bettering of the system will receive consideration. Otherwise, it will be difficult to induce lumbermen to consider favorably the other forest problems that, like the fire problem, must be solved if the forests of the State are to endure.

The most perfect system of fire protection would not in itself avert a timber famine or keep the mountains clothed with forests. The forests must of necessity be cut, and an uneconomical method of cutting could play as important a part in the destruction of the forests as fire itself. On the other hand, conservative methods of lumbering can be worked out which will even increase the profit of the lumberman in the long run and which will maintain the forest growth upon the mountain sides.

The reforestation of cut-over lands is a matter of the greatest interest to many progressive lumbermen, especially those who are operating in the redwood belt. For lack of opportunity to make experiments, this office has hitherto been able to furnish little assistance. Next to fire protection and the introduction of more conservative systems of logging, this is the problem of biggest interest to the people of the State. If it is solved it means that timber will replace brush and barrenness on an enormous area.

Recommendations regarding the planting of valley lands are easier to make, and the office has accomplished considerable along this line. The mild climate and long growing season make conditions favorable for a long list of species, and the valley lands, mostly bare of trees when first settled, have been since dotted over with many different species. Studies have already been made of these plantations, and the results of the studies are given in the report under the subject "Forest Extension."

This office should naturally be the source or distributing point for much statistical information of value to lumbermen, to wood users, and to the public generally. Such statistics must be gathered systematically to be of any value, and the pressure of other work, especially the forest fire work, has caused this branch to be neglected. A study of the wood using industries of the State has been begun in coöperation with the Federal Forest Service. More work should be done along this line. There is also an opportunity to be of service in testing out various woods for new uses, such as wood pulp, etc., and for the promotion of inferior woods to relieve the strain on the more valuable species.

Many requests have also been received to identify different species of commercial woods from samples of wood sent to us.

Similarly, specimens in the form of twigs, leaves, or fruits of various plants for identification. So far we have been able to satisfy these inquiries, but our own collection of specimens for comparison is far from complete, and present quarters are too crowded to admit of its exhibition. Data for a complete forest map has been gathered, but owing to

stress of duties on our small staff, its compilation and issuance will be delayed at least two months from date. The map, it is anticipated, will prove of great importance in future forest work.

It is apparent, therefore, that to carry this extended scope of usefulness throughout the State the appropriations heretofore granted this office are inadequate. Continually the widespread readiness of our citizens to accept additional services from the State Forestry Department is brought home to us. The education which has been given the public regarding the methods of practical forestry, such as we aim at, has resulted in an opportunity now before us to step into a wider field of usefulness, which will, in our opinion, add to the material prosperity of California and enrich the heritage of the future.

CHAPTER I.

FOREST DISTRIBUTION IN CALIFORNIA.

The State has an area, in round numbers, of 100,000,000 acres, of which about one third is in some degree forested, and one sixth bears, or is capable of bearing, forests of merchantable timber. The forests lie mainly on the uplands; and the topography of the State is such as to dispose them in a fairly continuous belt, which stretches up along the coast, across the highlands at the head of the Sacramento Valley, and southward down the Sierras, leaving the great interior valley and the depressions in the southeastern portion of the State unforested. Within this belt the forests are by no means homogeneous, but vary in character, composition, and density, to an almost unlimited degree. The west slope of the Sierras, for example, bears three distinct zones of forest growth, one above the other. First is a foothill zone with an open forest of short, branchy species. Above this, on the slopes of mountains proper, is a forest in which yellow pine predominates and which is the principal source of Sierra timber. Above this still is a zone containing California red fir, lodgepole pine, and various subalpine species, which extends up to timber line.

These three zones, or their counterparts, are found throughout the forested region, except in a limited area along the north coast where the redwood occurs. This area is distinct enough to deserve separate classification as a fourth zone. Each of these zones is variable from point to point, but yet possesses certain characteristics of growth, composition, or density which serve to distinguish it throughout.

This differentiation into zones is an expression of the relations of climatic conditions to forest growth; and, since moisture and temperature conditions vary from place to place according to elevation, latitude, and position with regard to the sea, each of these three elements exerts its influence on forest distribution.

Points near the ocean have a cooler and more equable climate, other things being equal, than those in the interior; and they have more rainfall and greater relative humidity. Similarly, temperatures become cooler from south to north, and rainfall and relative humidity greater. The most abrupt variations in climate, however, are produced by differences in elevation, the effects on temperatures being the same in going from a low elevation to a higher as in going from south to north, but much more noticeable in comparison to the distance traveled. Both

rainfall and the relative humidity of the atmosphere also increase in a marked degree with increase in elevation. It will, therefore, be of advantage to describe briefly the topography of the State, since it has an almost paramount influence on the general distribution of the forests.

Topography.

The State of California lies between the parallels 32° 40′ and 42°, corresponding to the portion of the Atlantic seaboard between Boston and Savannah. The coast line is nearly 1,000 miles long, and from the north curves strongly to the southeast, so that San Diego has the same longitude as the western boundary of Idaho. The eastern boundary parallels roughly the line of the coast at an average distance from it of about 200 miles. The mean length of the State is about 800 miles, and its area in round numbers is 100,000,000 acres.

In its broader aspects the topography is quite simple, much more so than that of the corresponding region on the Atlantic coast. The Sierra Nevada Mountains extend along the inland border in a southeasterly direction two thirds the length of the State. The coast system, composed generally of parallel ridges, lower than the Sierra, extends throughout the State on its seaward side. Between these two systems, and further hemmed in on the north and south by ranges connecting them, is the great central valley. And beyond the mountains, in the southeast corner, are the broad basins constituting the Mohave and Colorado deserts.

The Sierras are the highest mountains in the State. From Mount Shasta at the north, with an elevation of something less than 14,500 feet, to Mount Whitney, a trifle higher, 200 miles farther south, they extend in an almost continuous crest with an average elevation of over 7,000 feet. The highest portion of the range is from Lake Tahoe to Mount Whitney, south of which the elevation gradually decreases. North of Lake Tahoe the system broadens out, and consists of several ranges with occasional valleys intervening.

The eastern slopes of the Sierras are usually abrupt, and give rise to few large streams.

The western slopes are longer and more gradual, and the streams on this side of the divide are very numerous.

The range is new, geologically speaking, and the rivers almost without exception flow for a part of their length through deep and often impassable canyons, of which the Yosemite Valley is, perhaps, the most famous. The waters of many of the streams are used in irrigating the valley land below, or for the generation of electric light and power.

The coast system consists in general of parallel ridges, low but steep, extending northwest and southeast, often including fertile agricultural valleys, particularly about the middle of the range. Its rivers are

usually small, but their water is very valuable, especially toward the south, where the climate verges on the arid.

The coast mountains gradually increase in elevation from north to south. North of San Francisco Bay the mean altitude of the range is about 2,000 feet. The San Rafael Mountains are higher, with a general elevation of about 5,000 feet, and a considerable portion of the San Jacinto lies above 7,500 feet, rising to nearly 11,000 feet in the San Jacinto Peak. The range is rough and rugged throughout.

At the head of the Sacramento Valley, and to the northwestward, is a jumbled series of ranges that extend across from the coast system nearly to Mount Shasta. These mountains are exceedingly rough and irregular, with an average elevation of about 5,000 feet, though occasional peaks reach 8,000 feet. The principal ranges in the group are the Siskiyous, the Scott Mountains, the Marble Mountains, the Salmon Alps, and the Trinity Mountains. They contain very little agricultural land, but are forest land par excellence. They are drained by the Klamath and its tributaries, namely, the Scott, Salmon, and Trinity rivers, and to some extent, by the Shasta River.

At the southern end of the great valley, in latitude 35°, the Sierras and the coast ranges are connected by another cross range, the Tehachapis. These are much less in extent than the northern cross ranges and of less importance. Tehachapi Peak rises to an elevation of over 8,000 feet, but the mean altitude is about 5,000. The slopes of the range are largely desert in character.

The great central valley is about 350 miles long and 40 to 60 miles wide, with an elevation ranging from sea level to 200 or 300 feet. It is drained from north and south by the Sacramento and San Joaquin rivers, which unite just south of Sacramento and flow west into San Francisco Bay, thence into the ocean through a break in the coast range, known as Golden Gate. The floor of the valley is level or gently rolling, and the soil is exceedingly rich agricultural land.

The southeastern portion of the State consists of broad, depressed basins, hemmed in by mountains, and with detached mountain ranges which trend generally northwest and southeast, rising abruptly from the floor of it. Portions of the desert are below sea level, while some of its mountains rise to 11,000 feet. The soil is fertile in many places, but the rainfall is insufficient to support anything but the scantiest growth, and although it is cultivated here and there in spots and contains valuable mineral resources, an immense area must always remain unproductive because of the lack of moisture.

The topography of California is thus shown to consist essentially of alternate highlands and lowlands, parallel to the coast, the landward highlands having considerably greater elevation than the seaward.

The prevailing movement of air over the State is from the west or northwest, that is, from the Pacific Ocean, the source of moisture. The effect of this arrangement on the rainfall is apparent. The air currents meet first the coast range as a barrier, and, being deflected upward, deposit some of their moisture, especially on the seaward slopes.

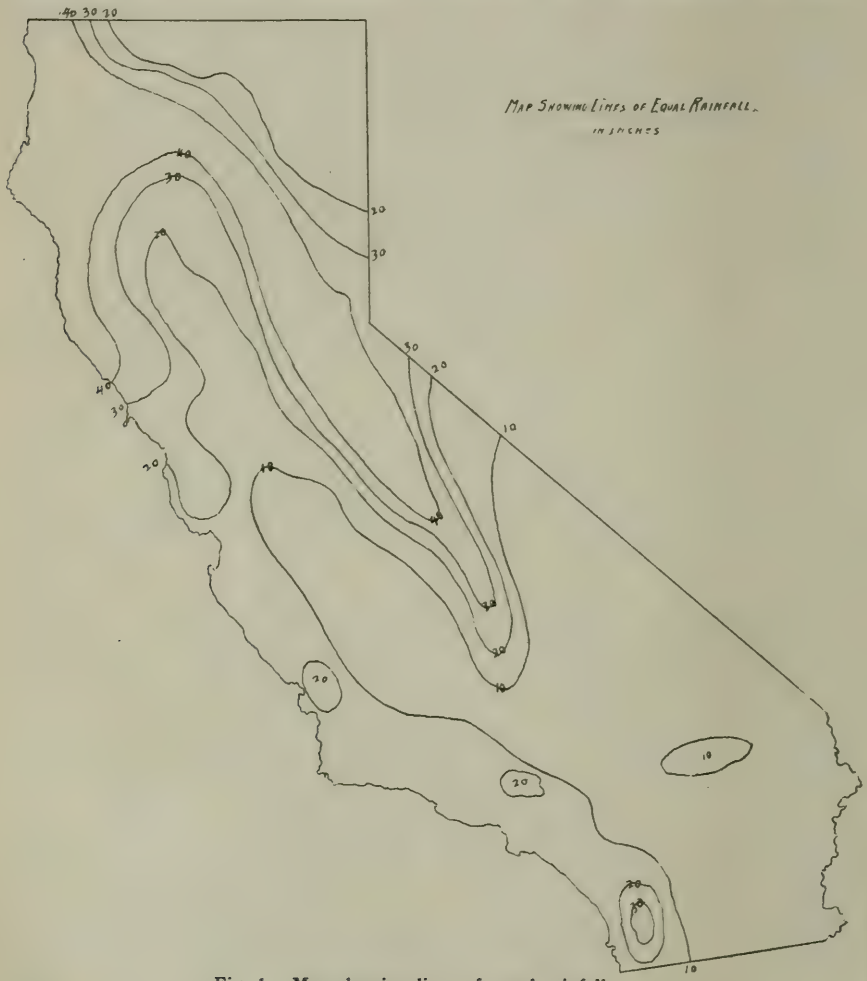


Fig. 1. Map showing lines of equal rainfall.

Crossing the great valley they strike the Sierras, and after being wrung out once more, flow down the eastern slopes, having lost somewhat of their moisture, but being especially deficient in relative humidity. Considering that the rains have their origin in the north Pacific, we should expect that the northwest portions of the State would be the wettest, and that the rainfall would decrease inland, except at constantly greater elevations, and also toward the south. This is precisely the case, as the rainfall chart (Fig. 1) clearly shows.

The area of heaviest precipitation forms a belt which includes the northern coast ranges, the mountains at the head of the upper Sacramento Valley, and the upper levels of the Sierras. It is surrounded by successive belts of lighter precipitation which are fairly broad on gentle slopes, but narrow on the steeper slopes. Toward the southeast, and with lessening elevation, the precipitation constantly decreases until finally in the desert lowlands the precipitation for a whole year may be too small to be measured.

Latitude, position relative to the coast, and elevation are therefore all factors in the rainfall. The heaviest precipitation occurs where all three factors are favorable, decreasing as one or more of them becomes less so, unless the deficiency is in some way compensated. Thus a place with low elevation in order to receive abundant rainfall must be situated not only in the northern part of the State, but also near the coast. If in the southern part of the State and inland, it must have considerable elevation. A few examples will show how the three factors compensate each other.

Eureka, situated on the north coast, at a low elevation, receives 46 inches of rain annually. Tehama, in the northern Sacramento Valley, has nearly the same latitude and elevation as Eureka, but because of its inland position it receives less than 19 inches. That this disadvantage might be compensated by increase in elevation is proved by reference to the rainfall of Quincy. This place has about the same latitude as Tehama, and is still farther from the coast, but its elevation of 3,400 feet gives it a rainfall of 43 inches, or nearly as much as Eureka's. East of the Sierras a still higher elevation is necessary to secure an equal rainfall. Susanville, for example, with an elevation of 4,200 feet, receives only 23 inches, or scarcely more than Tehama.

The effect of difference in latitude is shown by comparing Eureka with Ventura, which is also situated on the coast, but more than 500 miles farther south. In consequence, Ventura receives only 12 inches of rain as against Eureka's 46 inches. A trifle north of Ventura, and behind the range of mountains, is Tehachapi. In its latitude and in its inland position it is most unfavorably situated; but its elevation of 3,964 feet is sufficient to give it 10 inches of rain, or nearly as much as Ventura receives. The effect of difference in latitude, the other factors remaining the same, is shown again by comparison of Tehachapi with Quincy.

The preceding examples suffice to show that the rainfall of any given locality in California depends upon its latitude, its position relative to the sea, and its elevation.* The comparisons are not strictly accurate because the local influences that affect rainfall are left out of consid-

*No statistics are at hand regarding the relative humidity of the atmosphere, but it is certain that it varies along the same lines.

eration. But the general inferences to be drawn from them, that the areas of equal rainfall form belts, broad in the valleys and narrow on the slopes; that these belts increase in elevation toward the south; and that they are higher also on the landward slopes of the mountains than on the seaward, are quite correct.

Forest Zones.

The fact that the forest is not everywhere alike, but is separated into zones, throughout each of which forest conditions are generally similar, has already been mentioned. Throughout this chapter the four zones will be referred to as (1) the Redwood, or, more properly, Coast Zone; (2) the Foothill Zone; (3) the Mountain Zone; and (4) the Alpine Zone. The proportional area occupied by each, and its position in relation to the others, is made clear by the zonal map (Fig. 2.).

The *coast zone* occupies the seaward slopes of the coast ranges from central Monterey County north to the Oregon border. Its limits toward the south, and toward the interior, are determined by the range of the summer fogs. The belt is very narrow, and much interrupted south of Mendocino County. Its inland boundary touches two other zones. At the extreme north, and again at the extreme south, the mountains grow steadily higher from the sea, and rise beyond the reach of the sea fogs. The coast zone, therefore, gives way to the mountain zone. In Mendocino County the coast range succeeds, inland, to a valley, without fogs, and with small winter precipitation, being under the lee of the coast range. In consequence, this area is foothill zone.

The foothill, mountain, and alpine zones are more intimately related, being situated one above the other. The foothill zone at its lower limits joins the valley or desert type. The upper edge is the lower limit of the mountain zone, upon which in turn the alpine zone rests. In accordance with the laws governing the climate of California, the elevation of all the zones varies with the geographical location. Thus, if the lower limits of the middle zone, for example, on both slopes throughout the Sierra be considered as the edges of a plane surface cutting the range, this imaginary plane would incline toward the north, and, also, because the zone occupies a more elevated position on the east slope than on the west would tilt to seaward.

If this plane be now extended over the rest of the State, it will cut the Warner Mountains in northeastern Modoc County, the cross ranges at the head of the Sacramento Valley, and to the northwestward, the range between Glenn and Mendocino counties, the Santa Lucia, Santa Barbara, San Gabriel, San Bernardino, San Jacinto, Cuyamaca mountains, and some of the desert ranges.

Below this plane is normally a semiarid climate and a foothill forest.

Two exceptional areas have already been cited, namely, one in Monterey County, and the other in Humboldt and Del Norte counties,

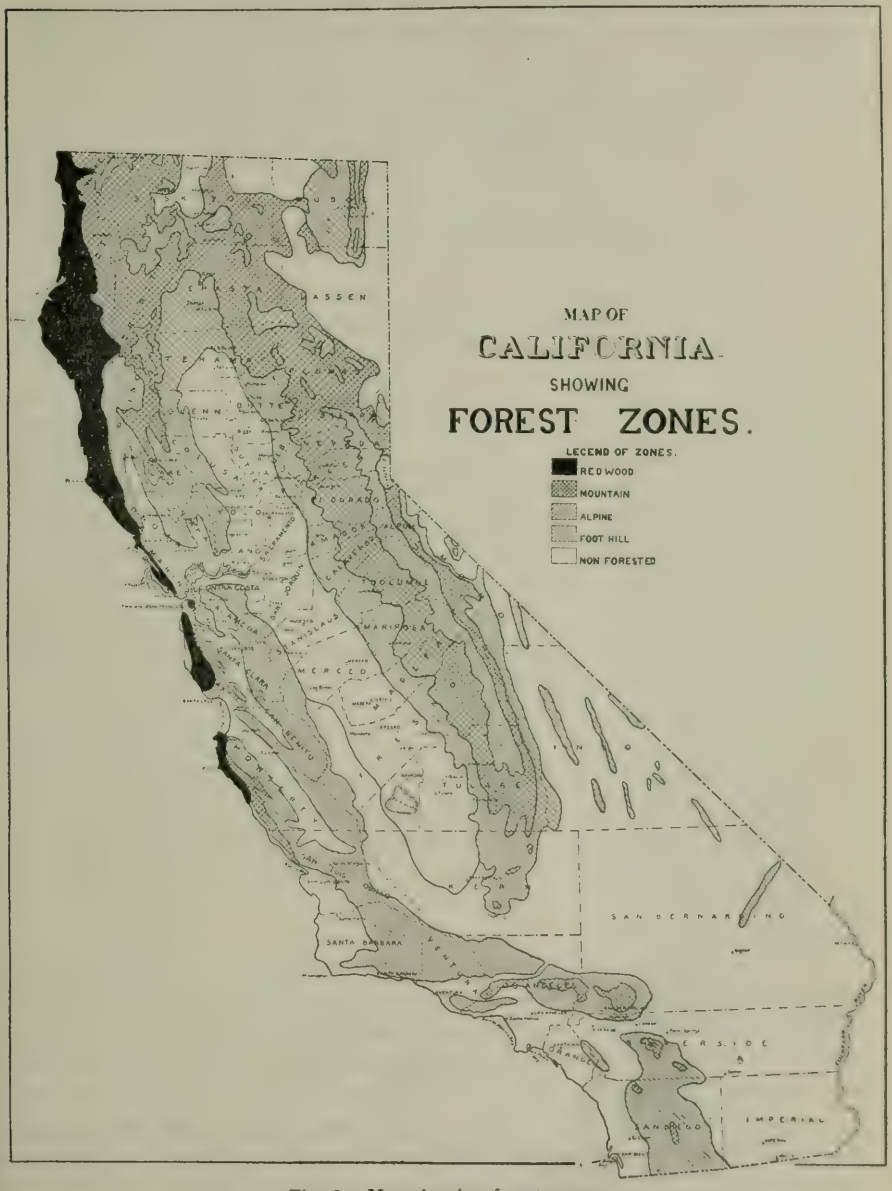


Fig. 2. Map showing forest zones.

where the area below the plane, instead of being semiarid, is extra humid by reason of the summer fogs; and consequently the coast forest there takes the place of the foothill forest. The foothill forest

is again absent in Lassen and Modoc counties east of the Sierra, where the very porous volcanic soil and the deficient rainfall combine to present conditions too arid even for the foothill forest, and the transition from the mountain zone to a desertlike sagebrush plain is abrupt.

A plane passed through the upper edge of the middle zone will cut also the Warner Mountains, the northern cross ranges, the Santa Barbara, San Gabriel, San Bernardino, San Jacinto mountains, and some of the desert ranges. Above this plane is the alpine type, occupying a considerable and continuous strip on the Sierras, appearing interruptedly on northern cross ranges, and on the southern mountains visible only as small islands.

The upper limit of the alpine zone constitutes timber line, and is present only on the summits of the Sierra and some of the northern cross ranges.

It has been presumed in the preceding examples that planes were used to separate the different zones. In reality, only an exceedingly warped surface would serve this purpose. The combined local effects of soil, inclination, aspect, and exposure are such as to make the edges of the zone exceedingly uneven, and near the border of two zones may be sufficient to turn the scale in favor of one or the other of them. It is not at all uncommon for the two slopes of a stream to be in different zones; for example, the slope with northern aspect belonging to a mountain zone, and the southern slope bearing foothill forest. Both slopes may receive the same rainfall, but on account of local influences one is semiarid and the other subhumid. On small areas two zones may even be transposed. For example, in Lake County yellow pine is occasionally found in valleys under the lee of hills, while Digger pine occurs above on the arid and wind-swept upper slopes. Such a case of reversal only strengthens the hypothesis that moisture conditions are of primal importance in determining the distribution of the forest.

Coast Zone.

The coast zone occupies a strip of land along the sea from central Monterey County northward. South of Mendocino County the strip is narrow, and often interrupted, being largely confined to canyons facing the ocean. Toward the north it broadens out, and in Mendocino and southern Humboldt it crosses the summits of the seaward ranges and strays inland for twenty-five or thirty miles. In northern Humboldt County it again becomes narrow and continues so to the Oregon border. The zone contains about 4,000 square miles, of which 1,250,000 acres belong to the redwood belt proper.

Since the coast zone, as thus defined, does not include the whole seacoast; the name chosen for it may be considered inappropriate, but the moist summer climate which it enjoys, and which gives to its

forests their distinctive character, is due entirely to its proximity to the sea, and this fact deserves recognition in its title Outside of the zone, as defined, this condition of climate does not exist. Southward, although the ocean exerts considerable influence in equalizing temperatures along the coast, it does not affect the humidity in any significant degree. The southern coast not only lacks the summer fogs, but receives small winter rains also. The climate is therefore not distinctively a coast climate, but as far as its influence on the forests is concerned, is similar to that of the foothills.

The most important species of the coast zone is the redwood, which forms solid forests of great extent in the northern portion of the zone, and is found in scattered groves to the southward. The area of its main distribution form a belt extendong from the Oregon line to the mouth of the Russian River, being contiuous except for a gap of a few miles in southern Humboldt County. Its width varies from four to twenty-five miles, being least in Del Norte County, reaching its maximum in central Mendocino County, and lessening again southward. It contains about 1,250,000 acres, of which more than 20 per cent have been cut over. Of the outlying bodies of redwood the most interesting are those on the Chetco River in Oregon, which mark the northern limit of the species, and the splendid redwood forest in the Santa Cruz Mountains, which has been purchased by the State as the California Redwood Park. The most important forests of the coast zone are the redwood forests of Del Norte, Humboldt, and Mendocino counties. The forests in the canyons of Marin and Monterey counties are comparatively small.

In topography the coast zone is generally rough throughout. The land rises precipitously from the ocean, and is at first level or gently rolling. Within a mile the hills begin, and they extend inland to the limits of the zone. The ranges are generally parallel to the coast, and are low but steep. Spurs, often higher than the main divides, extend from the ridges in all directions, making the topography exceedingly complicated.

In Mendocino County the ridges seldom exceed 2,000 feet elevation, and the fog rolls over their summits and inland to a point where foothill conditions obtain. At the northern and southern extremities of the zone the mountains are higher and rise beyond the reach of the fog. In consequence, coast conditions are there replaced by mountain conditions.

The zone is crossed by half a dozen large rivers, and numerous small streams flow directly into the ocean, each draining a small watershed. The valleys are usually narrow and canyon-like, with steep slopes; but along the larger streams occasional flats occur, and it is in these situations that the coast forest reaches its best development.

The soil, even on the steep slopes, is usually deep and of good composition, varying from a clayey to a sandy loam. On the upper slopes, with south or southwest exposures, it is often thin and light, and next to the ocean is apt to be sandy, but in the main it is very fertile for forest soil.

The fogs have already been mentioned as the distinguishing feature of the climate of the coast zone. They occur at all times of the year, but are especially frequent during the summer. At Eureka, between May and September, only about forty days are clear, and the rest are cloudy or partly cloudy.

The amount of soil moisture furnished by the fogs is not easily measurable, but must be large, and is probably important. The action of trees in precipitating it can be easily observed, for example, on the slopes of Mount Tamalpais. There, during foggy weather, the open grass land is damp, but under the scattered red firs the ground is spongy with moisture, and the drip from the trees is incessant. Here, at any rate, is a case of forests influencing precipitation. The fog moisture, however, does not require to be precipitated in order to exert its influence. During the foggy season the relative humidity is naturally very high, and the loss of water from the tree by evaporation proportionately low. In addition, moisture is absorbed through the leaves directly from the atmosphere.

For the rest, the coast zone has a cool and equable climate, and a heavy winter rainfall.

Three distinct types of forest occur within the coast zone, namely, the shore type; the redwood belt already mentioned; and the red fir type, which in the northern part of the zone adjoins the redwood belt on the east. The shore type occupies a strip along the immediate coast. It is seldom more than a mile wide, and in many places is crowded out completely by the redwood belt coming down to the edge of the land. In soil and situation it is generally unsuitable to the redwood. The strong ocean breezes to which it is exposed carry abundant moisture, but also induce excessive evaporation; and the sandy soil is not retentive of water. In consequence, this strip is comparatively drier than situations farther inland where the winds are checked by ridges, and the soil is deep and loamy.

The shore type from Humboldt County northward consists largely of brush composed of salal, salmonberry, and elder, with occasional stands of shore pine (*Pinus contorta*) and lowland fir (*Abies grandis*); and scattered Sitka spruce, maple, laurel, and alder near the mouths of streams. Port Orford cedar and hemlock also occur.

From Mendocino County southward the brushy areas are less frequent, and broad areas of open grass land occur between the clumps of trees. None of the conifers mentioned above extend south of

Mendocino County. The shore pine is replaced by another species (*Pinus muricata*), which has an interrupted range throughout the rest of the coast zone. The two species of pine occur together on the Mendocino coast in the neighborhood of Fort Bragg.

Near Monterey another variation of the shore type occurs, containing two remarkable species, the Monterey pine (*Pinus radiata*) and the Monterey cypress (*Cupressus macrocarpa*).

The forests of the shore type are very scattered, and although often dense contain little merchantable timber. The three shore pines have a strong tendency to form pure stands, and the forests of muricata and radiata, when grown in the more sheltered situations, sometimes furnish excellent cordwood. In general, however, the trees of the shore type are scrubby and misshapen from exposure to the winds.

The redwood type is found from near sea level up to an elevation of 2,000 or occasionally 3,000 feet. The soil, even on the steep slopes, is usually deep and fresh, and the stand of timber is remarkably heavy. The finest forests, both as regards density and the development of individual trees, occur in Humboldt and Del Norte counties, on the flats along the larger streams or on the benches immediately above them. In such situations the redwood is found growing pure, or with an insignificant admixture of spruce, Port Orford cedar, hemlock, or lowland fir. On the slopes the trees are not so large and the proportion of other species in mixture is greater, though it seldom exceeds 25 per cent, and is ordinarily much less.

The growth on the flats is quite distinct from that on the slopes, and although their aggregate area is less than 30,000 acres they deserve to be separately described.

Typical redwood flats occur along the Eel River, and in Del Norte County. They decrease in number and size southward, until in Mendocino County they form an insignificant part of the stand. At their best they contain no other tree but redwood, and very little undergrowth. The trees are the tallest and largest representatives of the species, and the density is such that yields of more than a million board feet have been obtained from a single acre of this type of forest. The great height of the trees and the density of the stand allow so little light to reach the ground that the general effect is not unlike that of the interior of a cathedral, the illusion being further carried out by the columns of the redwoods themselves. Moss, oxalis, and bracken fern form the usual undergrowth, the last growing in patches where the sunlight strikes.

On the slopes the redwood is still the predominant tree, but is associated constantly with Douglas fir, hemlock, cedar, tanbark oak, or other less important species. The mixture varies according to the locality, red fir and tanbark oak being characteristic associates on the

upper slopes and hemlock on the lower. There is usually a dense undergrowth of Oregon grape, salal, and berries; and soil and humus conditions are good in spite of the steepness of the slopes.

The stand of timber ranges from 10,000 feet B. M. per acre up to 100,000 feet B. M. Exceptional redwood slopes have yielded as much as 400,000 feet B. M. per acre, but the average yield is much less than that of the flats.

The red fir type extends from the edge of the redwood belt across Del Norte and Humboldt counties, gradually changing in character as it spreads eastward and gains in elevation, until it finally becomes the mountain type of forest with yellow pine and sugar pine in the mixture. It is properly a transition type, connecting the coast zone with the mountain zone, and partaking somewhat of the nature of both. Its constituent species are common to both, but characteristic of neither. Along the western edge scattered redwoods occur, and on the eastern border yellow pine and sugar pine come in, but the bulk of the forest is made up of red fir associated with more or less tanbark oak and black oak.

In the moister situations the forest consists almost wholly of red fir growing in dense stand, and with excellent individual development. Toward the interior the type is largely confined to north and east slopes, and the shady side of canyons, the hotter and more arid localities being occupied by a scrubbier growth in which yellow pine is a constituent.

The stand of timber varies from 2,000 to 25,000 feet B. M. per acre. Near the western edge of the type it is densest, and the growth and development of the trees are the best; and for this reason, as much as for any other, the type has been included with the coast zone rather than with the mountain zone. The average stand for the type is between 5,000 and 10,000 board feet per acre.

Foothill Zone.

The foothill zone is distinguished by its semiarid climate and the open, brushy character of its forests. It occupies a position topographically as well as silvically between the well timbered middle zone and the treeless areas comprising the central valley and the desert. It covers the lower slopes of the Sierras, the southern slopes of the northern cross ranges, both slopes of the inner ridges of the northern coast ranges, all but the summits and the seaward slopes of the southern coast ranges as far south as Santa Barbara, and all but the summits of the Tehachapi, San Gabriel, San Bernardino, San Jacinto, and Cuyamaca mountains of southern California. It ascends the east slope of the Sierras, is found on the mountains in the northeast corner of the State, and forms a belt on some of the desert ranges. Its area is about 27,000 square miles.

The foothill zone proper lies between the 500 and 2,000-foot levels at the head of the Sacramento Valley, gradually increasing in elevation toward the south and toward the interior. In the southern Sierras its upper limit is near the 4,500-foot contour, and in the San Jacintos it extends above 4,500 feet. In the Santa Lucia Mountains, which parallel the coast south of Monterey Bay, the influence of the ocean lowers its ranges to between 400 to 2,500 feet. At its upper limits the foothill type of forest mingles somewhat with the middle belt, where that is present, and at the lower levels it straggles irregularly out into the valleys, or upon the desert.

Since it covers so much country the zone includes every description of soil, slope, and exposure, and varies somewhat in the composition of its forests. The climate, however, and the character of its forests is essentially the same throughout. It is a region of warm temperatures and low relative humidity, and receives less than 30 inches of rain, most of which falls in the winter. In consequence, excepting near streams, the soil, whatever its composition and whatever its inclination or aspect, is generally dry during the growing season, and it is from this circumstance that the zone mainly derives its character.

Natural conditions are such as to make dense forests impossible except in specially favored situations, and the forests of this zone are open, the trees short and limby, and the shade cast by them insufficient to prevent the growth of chaparral, which in consequence thrives abundantly. Toward the north grassy stretches are frequent, and the zone is largely used for grazing. Southward, the chaparral becomes denser, and the open patches smaller in extent.

The competition in this zone between the tree species and the chaparral is very keen, and the advantage lies entirely with the latter. The tree species being situated in naturally unfavorable conditions for growth and reproduction, require to be nursed and protected by man. But the fact is that the ordinary treatment the zone receives is of a sort to increase the extent of chaparral and eliminate trees entirely. Most of the chaparral species sprout after being burned, while many of the tree species do not; and since the aridity of the long summer season invites frequent fires, the chaparral is constantly gaining ground in this way.

The fact that the foothills have a comparatively low elevation and receive little rain, would tend to make their forests unimportant in regard to the conservation of water. In northern California this is very generally true. There the areas of dense forest in the middle and upper zones are large and receive most of the rain, and if they are properly cared for in future, should serve to regulate the stream-flow adequately. In southern California, on the contrary, the area of forests in the two upper zones is comparatively small, the foothill zone ranging

proportionately higher on the slopes; and as water is more scarce and valuable than it is in the north, the protection and extension of the foothill forest becomes a matter of supreme importance.

Planting has been resorted to in southern California with some success. By careful selection of species and sites, it is quite possible that the forest in this zone may be extended, and experiments are being carried on for this purpose. The prime necessity, however, is protection from fire, and to this end most of the mountainous country of southern California has been reserved by the Government. The value of chaparral as a water conserver must not be underestimated. Dense chaparral is probably more effective in preventing run-off and holding the soil than the scattered growth of trees found at present on the foothills, and although it is certain that dense forests would be more satisfactory, yet until they have become established, the present growth must be depended upon and protected.

The foothill zone comprises two broad types of forest, the one covering the greater part of the area of the zone in northern California west of the summit of the Sierras, and the other covering the remainder of the zone. The former has the larger area. It contains three principal species, namely, valley white oak (*Quercus lobata*), blue or mountain oak (*Quercus douglasii*), and gray or digger pine (*Pinus sabiniana*). These occur together to some extent, but each has a tendency toward forming pure stands, and their natural ranges differ slightly. The valley oak has the lowest altitudinal range, occurring not far above the level of the valley; the blue oak ranges higher over the foothills; the digger pine goes higher still, extending up to the border of the mountain zone, and frequently mingling along its upper limits, with yellow pine, Douglas fir, and other stragglers from the mountain zone. All of these species have a wide distribution within the zone, and all reach their southern limits in the eastern portion of the Santa Barbara National Forest.

Numerous other species have a more or less limited or casual occurrence within the oak and pine type of the foothill zone. Among these are Gowen's and Macnab's cypresses, bigleaf maple, buckeye, post oak (*Quercus garryana*), the three live oaks (*Quercus chrysolepis, Quercus wislizeni*, and *Quercus agrifolia*), California laurel, Christmas berry (*Heteromeles arbutifolia*), and some others of less importance.

The oak and pine type does not furnish saw timber, except on rare occasions when digger pine is sawed for local use in the absence of superior species. All of the three principal species are cut to a greater or less extent for fuel, but the pine burns quickly, and the oaks are inferior to the black oak, which occurs in the mountain zone. On the whole, the oak and pine type of the foothill zone contributes comparatively little to the forest resources of the State.

From the Santa Barbara Mountains southward the forests of the foothill zone consist chiefly of chaparral with occasional tree species scattered among it. Bigcone spruce is the principal coniferous member of the forest, occurring as a straggler from the mountain zone. Stands of *Quercus chrysolepis* and *Quercus wislizeni* also occur. Chaparral, however, is the dominant feature, forming stands of variable density and variable composition. The type contains but little usable material of any sort, and the cutting of timber within it is very slight. The chief value of it lies in its power of water conservation.

Mountain Zone.

By reason of its great extent and the valuable character of its forests, the mountain zone is the most important of the four zones into which the forests of the State are divided. Its forests are not only a principal source of timber, but being situated on the uplands, control the run-off of large and important watersheds as well. The zone at its best is represented by the forests of the west slopes of the Sierras, but it is found also on the northern cross ranges, the coast ranges, including the mountains of southern California, the mountainous and mesa-like formations in the northeastern part of the State, the east slopes of the Sierras, and portions of the desert ranges. It has an approximate area of 21,000 square miles.

It has throughout a warm temperature climate and a fairly long growing season. Practically no rain falls during the summer, but the winter rains are heavy, amounting, as a rule, to 35 inches or over. In localities where conditions of soil and seepage are so favorable as to make up for the deficiency, the forests of this zone will flourish with somewhat less precipitation.

Since the humidity decreases as a rule with decrease in elevation, the zone is normally bounded at its lower levels by the semiarid foothill zone. The exceptions to this rule, namely, where the mountain zone joins the coast zone and where it touches desert-like conditions directly, without an intervening strip of foothill zone, have already been noted and explained.

The zone in northern California lies generally between 2,000 and 5,500 feet, typical forests occurring between 3,000 and 5,000 feet. Southward it gradually ascends, rising in the San Jacintos and on the west slopes of the southern Sierras to between 4,500 and 9,000 feet, and on the eastern slope of the southern Sierras, reaching a maximum elevation of 10,000 feet. This extreme is touched only on occasional dry slopes with southerly exposure. The zone descends somewhat on slopes with northerly or easterly exposure.

The forests, though inclined to be open and parklike, are often very dense from the point of view of the merchantable lumber they

contain. The principal species, in the order of their importance, are: Yellow pine, sugar pine, Jeffrey pine, white fir, incense cedar, with Douglas fir appearing in the northern part of the zone, and its relative, bigcone spruce, replacing it to the southward and big-tree in limited areas of the central mountains. All of these trees reach a large size, and most of them furnish a large percentage of clear lumber.

As an under-story, or occasionally found in the over-wood, are California black oak, live oak (*Quercus chrysolepis*), black cottonwood, tanbark oak, madrona, yew, nutmeg, alder, and some others, besides chaparral of various species.

The bulk of the forest of the mountain zone is yellow pine, which usually forms 30 to 50 per cent of the stand. Incense cedar comprises 20 to 30 per cent; sugar pine, the stand of which is very variable, 5 to 25 per cent; Douglas fir, 5 to 15 per cent, decreasing in importance from north to south, and finally giving way to bigcone spruce. Jeffrey pine, in the mountain zone, forms not more than 5 per cent of the stand except in the southern Sierras, particularly on the east slopes, where it to a large extent replaces yellow pine.

The stand varies from 2,000 to 100,000 feet B. M. per acre, average first-class virgin timber running about 25,000 feet B. M. The general average for the type is well over 15,000 feet B. M.

In consequence of their high commercial value, the forests of the mountain zone have been largely cut over for lumber. In some places the forest has simply been culled of its best trees; in others, the area has been striped clean. The areas of clean cutting are, however, very few. The mountain forest is usually a selection forest containing trees of all ages and sizes. As long as transportation facilities and market conditions are unsatisfactory, it is unprofitable to log the poorer and smaller grades of lumber. Therefore, although so many trees of the valuable species are cut, a certain amount of young stuff and a few old and unsound specimens are usually left.

The most valuable species are naturally the most sought after. Sugar pine goes first, then yellow pine, and then at a considerable distance behind, Douglas fir, white fir, and incense cedar. The sugar pine, already poorly represented in the original stand, has still less chance in the future forest because it is cut closer than any of the others. The cut. The tendency, therefore, is for Douglas fir, incense cedar, and white fir to increase proportionately for the reason that the majority of seed-trees left after lumbering are of these species. This would undoubtedly be the case but for the aggressive manner in which yellow pine reproduces itself, so that although few seed-trees remain after lumbering, the yellow pine nevertheless holds its own fairly well in the reproduction, provided that fires are kept out.

Fires, however, follow the lumbering of yellow pine almost inevitably,

and with the destruction of the seed-trees the opportunity of yellow pine to reëstablish itself vanishes completely.

From north to south the character of the mountain zone gradually changes, making it possible to subdivide the zone into three broad types. In the Klamath Basin a large proportion of the area within the mountain zone consists of stands in which Douglas fir (*Pseudotsuga taxifolia*) is the predominant tree. This type of forest is particularly abundant on north and east slopes, but is found to some extent on all. Southward the area of the type constantly diminishes, and in the southern Sierras, vanishes entirely. The yellow pine-sugar pine type increases proportionately, and from the neighborhood of Mount Shasta south to the basin of the Kern River it predominates. Within the Kern Basin, however, the yellow pine is replaced in a large degree by Jeffrey pine, and the latter species continues to prevail southward. The yellow pine-sugar pine type is in general the most important.

Alpine Zone.

The alpine zone is everywhere bounded at its lower levels by the mountain zone. It has a humid climate, with comparatively low mean annual temperature and short growing season. Its forests are distinguished from those of the latter by greater density, and smaller trees of different species. At the lower limits of the zone the density of the California red fir forests is remarkable; higher up the effect of exposure causes the forest to become more open. The alpine zone is found on the Warner Mountains, the Scott, Trinity, and Siskiyou mountains, the Sierras throughout, and the ranges from the Santa Barbara Mountains southward. Some of the highest of the desert ranges also bear thin strips of alpine forest. The total area of the zone is something less than 4,000,000 acres. It ranges in northern California between 5,000 and 8,000 feet, even extending up beyond 9,000 feet in favorable situations on Mount Shasta. About Lake Tahoe its limits are between 6,000 and 9,000 feet. About Mount Whitney it ranges between 9,500 and 13,000 on the west slope and somewhat higher on the east. On the mountains of southern California it extends from 9,500 feet to the summits.

The composition of the alpine forest changes greatly from point to point. The only important species that occur throughout the zone are the Jeffrey pine and lodgepole pine, and these species, though occurring in considerable quantities, are not valuable timber trees within the zone.

As far south as the southern Sierra the California red fir is the most important species, and practically the only one in the zone furnishing merchantable timber. But it does not occur in the southern mountains. White-bark pine and limber pine together cover the zone, the former

being the northern representative and the latter replacing it southward. They are both trees of very high altitudes, and for this reason do not occur on some of the mountains where the lower strata of the alpine belt are represented.

Other species found occasionally, particularly toward the north, are western white pine, foxtail pine, weeping spruce, black hemlock, western juniper, quaking aspen, paperleaf alder, bitter cherry, and dwarf maple.

Although mixed forests are not uncommon in the alpine type, the tendency in many of the species to form pure stands is very strong. California red fir and lodgepole pine are particularly noteworthy in this respect, and even the timber line pines and the black hemlock form occasional patches of pure growth. This is probably due to the fact that, owing to the exposure, small differences in situation are of greater moment in this type than in the one below it. Instead of preventing conditions in which a great number of species may grow together side by side, this type is largely broken up into small areas, in each of which a particular species finds a comfortable environment.

The alpine forest as a whole is a protection forest, pure and simple. It not only contains few merchantable species but is also, as a rule, too inaccessible to be logged profitably. Doubtless the time will come when some of the forests of California red fir will be exploited, and the scattered white pine will also some day have a commercial value. But at present the zone does not figure largely among the timber resources of the State. As a protection forest, however, its value is considerable. The forests of lodgepole pine and California red fir are the only forests in the State, with the exception of those of the coast zone that form humus to any extent. In addition, their commanding position on the uppermost slopes of the mountains does much to compensate for their small extent as compared with the forests of the mountain zone. They are, therefore, well worthy of preservation.

Since there is so little lumbering in the zone at present, one source of danger to the forests is removed. The danger from forest fire, however, remains, and this danger is extreme. The very density of the forest which makes it so valuable in conserving the water supply permits fiercer and more disastrous fires than occur in the more open mountain zone, and the thinness of the bark of most of the species causes them to be exceedingly susceptible. The total destruction of excellent stands of California red fir and lodgepole pine may be observed almost anywhere throughout the zone where these species occur, and the conversion of forest into chaparral goes on rapidly.

Chaparral fields containing no trees at all are common in the alpine zone, and are, almost without exception, the result of fires, which upset the balance, naturally in favor of the forest, and give the advantage to the chaparral. On the edge of most chaparral fields in this zone the

forest may be found gradually encroaching, and in time and under natural conditions would probably reclaim the whole area; but fires are so likely to recur that natural conditions do not prevail for long, and the fire, though it burns chaparral and seedlings alike, destroys the latter but permits the former to sprout again.

NOTES ON SPECIES.

Yellow Pine (Pinus ponderosa).

Yellow pine, growing pure or in mixture with other species, is found throughout the mountain zone. Its large size, clear and excellent lumber, and especially its abundance, make it one of the three most important timber trees in the State; and its power of reproduction and rapid growth in favorable situations give promise that it will increase in importance as time goes on, in spite of the immense amount of it cut annually.

Within its range it occurs on all soils, and on slopes having various degrees of inclination and aspect. It is not abundant on north slopes, however, and reaches its best development on benches on the west flank of the Sierras, and especially in the plateau region about Mount Shasta. In the latter region it forms 80 to 90 per cent of the stand, and exceptional areas yield as much as 150,000 feet B. M.

Southward on the Sierras the development of the individual trees is often as good, but the proportion of yellow pine in the stand is apt to be less, and the yields of it per acre consequently not so large.

At its best it has a diameter of six to seven feet and a height of 175 to 200 feet. Average maximum dimensions are three to four feet diameter, and 150 to 180 feet height. Its bole is cylindrical and clear for about one half its length, surmounted by a conical crown, which in old age flattens out. Occasional trees reach an age of 500 years, but the average age of the oldest trees cut does not usually exceed 300 years.

Yellow pine is a prolific seeder and the percentage of germination is large. The seedlings come up well in all situations that have abundant sunlight, and form dense thickets. The species is not capable of enduring much shade, and for this reason is less numerous on northern slopes than on slopes with south, east, or west exposure. Its need of sunlight is also responsible for the cleanness of its bole. Even when grown in the open, the mature trees are seldom limby, and when grown in dense thickets the lower portion of the crown dies in the shade of the upper portion, which makes up for the loss in leaf surface by constantly striving higher toward the light.

At the age of 100 years the yellow pine has reached, on the average, a diameter of 20 inches, and a height of 94 feet. Hubbard calculated that, in an exceptionally favorable situation near Mount Shasta, a tract

containing an average of 500 saplings to the acre, 4 inches in diameter and fourteen years old, would yield in forty years 120 trees to the acre, 16 inches in diameter, or 20,000 board feet per acre. The stand of yellow pine in this locality is quite pure.

The tract in question is remarkable chiefly for containing so many 4-inch trees to the acre, and for the conditions of growth that enable a seedling to reach that diameter in only fourteen years. Elsewhere in California a 4-inch tree would, on the average, be much older than fourteen years in average good situations anywhere within its range.

Satisfactory reproduction of yellow pine can be secured after lumbering without great difficulty or expense by leaving a few seed-trees on each acre, and by preparing the seed-bed by burning the débris at the proper season, in a manner not dangerous to the seed trees.

In the ordinary course of lumbering, as carried on at present, enough crooked, unsound trees, or trees too small to cut, but still old enough to bear seed, might be left to provide adequately for reproduction. Too often, however, the culls and small trees are destroyed in the felling of the neighboring trees or by the fires that follow the lumbering, and the area is left to be seeded up to worthless species. Probably, too, even these are later destroyed by fire, and only chaparral is left to cover the ground. Patches of natural reproduction, however, are numerous, and in general the reproduction of the tree would be excellent, but for fire.

The following tables show the average heights and diameters of yellow pine at different ages; and the average volume in board feet of trees of different diameter and heights:

TABLE I. YELLOW PINE.

Age.	Butte County.		Madera County.	
	Diameter breast-high.	Height.	Diameter breast-high.	Height.
Years.	*Inches.*	*Feet.*	*Inches.*	*Feet.*
10	0.4	6	0.5	6
20	2.3	12	4.0	20
30	4.3	19	7.2	38
40	6.5	29	10.0	51
50	8.9	44	12.4	61
60	11.4	57	14.3	68
70	13 8	69	16.0	75
80	16.1	79	17.4	81
90	18.1	87	18.9	87
100	20.0	94	20.3	94
110	21.7	99	21.4	100
120	23.3	104	22.5	105
130	24.6	108	23.6	111
140	25.8	112	24.6	116
150	27.0	115	25.5	120
160	28.0	118	26.4	123
170	29.0	121	27.2	126
180	29.8	123	28.0	128
190	30.6	125	28.7	130
200	31.3	127	29.4	132

TABLE II. VOLUME TABLE FOR YELLOW PINE.

Trees Under 100 Feet.			Trees Over 100 Feet.		Trees Over 100 Feet.		
Diameter breast-high.	Butte County.	Madera County.	Butte County.	Madera County.	Diameter breast-high.	Butte County.	Madera County.
Inches.	*Volume board feet.*	*Volume board feet.*	*Volume board feet.*	*Volume board feet*	*Inches.*	*Volume board feet.*	*Volume board feet.*
11					33	1,990	
12		27			34	2,170	
13	20	42			35	2,350	
14	45	61			36	2,520	
15	75	86			37	2,710	
16	105	116			38	2,890	
17	150	153	230		39	3,070	
18	200	197	285		40	3,240	
19	260	248	345		41	3,425	
20	325	318	405	449	42	3,605	
21	400	378	470	519	43	3,800	
22	470	451	540	597	44	3,990	
23	540	531	615	685	45	4,170	
24	615	612	700	778	46	4,350	
25	690	693	790	883			
26	770	772	900	995			
27	850	849	1,020	1,119			
28	930	924	1,150	1,253			
29	1,010		1,290	1,398			
30	1,090		1,460	1,543			
31	1,170		1,635	1,711			
32	1,250		1,810	1,897			

Sugar Pine (Pinus lambertiana).

Next to yellow pine the sugar pine is the most important tree of the middle zone. Its lumber is even more highly prized than that of the yellow pine, and it surpasses it in size. It is less abundant, however, and its habits of growth and reproduction are such as to make its survival extremely doubtful. Its reproduction is not keeping pace with the cutting of it, and unless a radical change is made in the method of lumbering it will form a smaller and smaller percentage of the forest from year to year, and perhaps in the future be exterminated altogether as a timber tree.

Sugar pine, though not abundant, is very generally distributed throughout the middle zone, ranging from 500 to 1,000 feet higher than yellow pine. On very small tracts, especially in the northern part of the State, it may form as much as 50 per cent of the forest, but its average maximum representation is from 5 to 20 per cent, and over large areas within its range it may be entirely absent.

It prefers cooler situations than the yellow pine, growing best in rich, fresh soil, particularly on north slopes. On slopes with southerly or westerly exposure it occupies the shadier spots in the hollows. It is much more fastidious than yellow pine.

Sugar pine is the largest of the pines of North America, individuals occasionally reaching a height of 225 feet and a diameter of 10 feet,

although such dimensions are not common. The diameter of the largest trees is ordinarily between four and six feet, and the height about 180 feet. Like yellow pine, it develops at maturity a long, clear, cylindrical bole, and the conical crown of early growth becomes broad and flattened. It reaches an age of more than 500 years.

In favorable situations it grows rapidly. At 100 years of age it is somewhat behind yellow pine, having an average diameter of a trifle less than 19 inches and a height of 92 feet. Its rate of growth diminishes much less rapidly, however, and at 150 years it has surpassed the yellow pine, retaining its lead for the rest of its life.

The sugar pine is decidedly intolerant of shade, and yet the seedlings require a moderately moist seedbed in which to sprout. These two requirements, namely, abundant sunlight and moist soil, are, as a rule, contradictory throughout the range of the species, where the sunny slopes are apt to have a hard, dry soil; and this is undoubtedly one reason why sugar pine is of such limited occurrence. Of the two requirements, soil moisture is most important in the earliest stages of growth, when the seedlings are establishing a root system. During this period they can endure a certain amount of shade, provided it keeps the soil from drying out. Later, however, when an adequate root system has been developed, full sunlight is essential, and moisture, though always important, takes a second place.

Seed production is small, and at two to three-year intervals. The large seeds are highly prized by the squirrels, and crops of seed that look very promising early in the season are often entirely devoured before maturity.

It is difficult to speak optimistically of the future of sugar pine. This, the most valuable tree in the forest, is the most fastidious also. It forms but a small percentage of the stand, and is associated with numerous species, any one of which, under normal, natural conditions, has a better chance of reproducing. Its chance of establishing itself in the future forest is still further reduced by the way it is lumbered. Being so valuable it is cut more closely than other trees, and fewer small trees are left in proportion to the number of trees cut than is the case of other species. The proportionate number of seed-trees of yellow pine and cedar is thus increased, and as these have already the advantage of being more adaptive, regarding soil and situation, they will effectually crowd out the sugar pine, except from those small and scattered areas where it forms a majority of the stand.

The following tables show the average height and diameter of sugar

pine at different ages; and the average volume of trees of different diameter and heights:

Age.	Diameter breast-high.	Height.
Years.	*Inches.*	*Feet.*
10	0.7	7
20	2.5	15
30	4.1	22
40	5.8	29
50	7.8	39
60	9.9	49
70	12.2	60
80	14.4	70
90	16.5	81
100	18.7	92
110	20.9	103
120	23.0	113
130	24.9	122
140	26.6	128
150	28.2	134
160	29.3	138
170	30.4	140
180	31.4	143
190	32.0	144
200	32.4	144

VOLUME TABLE.

Diameter breast-high.	Trees under 100 feet high.	Trees over 100 feet high.	Diameter breast-high.	Trees over 100 feet high.
Inches.	*Volume board feet.*	*Volume board feet.*	*Inches.*	*Volume board feet.*
12	20		37	2,025
13	38		38	2,175
14	58		39	2,338
15	80		40	2,500
16	112	140	41	2,663
17	139	175	42	2,850
18	180	220	43	3,038
19	225	263	44	3,225
20	270	312	45	3,400
21	335	363	46	3,600
22	375	425	47	3,800
23	438	483	48	4,000
24	500	550	49	4,213
25	567	630	50	4,438
26	638	715	51	4,675
27	715	800	52	4,900
28	783	900	53	5,150
29	875	1,000	54	5,400
30	950	1,110	55	5,675
31	1,038	1,225	56	5,975
32	1,125	1,350	57	6,275
33		1,475	58	6,600
34		1,610	59	6,900
35		1,750	60	7,215
36		1,875		

Jeffrey Pine (Pinus jeffreyi).

Jeffrey pine has an extremely wide range within the State of California, occurring on all the mountains which have sufficient elevation to present conditions characteristic of the alpine zone. It also occurs in the mountain zone, where it reaches its best development and becomes a timber tree; but there it is numerically unimportant while in the alpine zone it often forms a considerable proportion of the forest. Its altitudinal range is between 5,000 and 8,000 feet in the northern cross ranges and northern Sierras, between 6,000 and 9,000 in the southern Sierras, extending up to 10,000 feet in places on the east slope, and forming a general upper limit of 9,500 feet in the southern mountains. It is much more common on the eastern slope of the Sierras and toward the southern limit of the range than the yellow pine, and largely replaces the latter in these localities.

In the mountain zone Jeffrey pine seldom forms more than 5 per cent of the stand, and is entirely absent throughout large areas. Where it occurs it is associated with yellow pine, sugar pine, and white fir. It reaches a height of nearly 175 feet and a diameter of 5 feet, developing a long, straight, cylindrical bole, clear to a height of 60 feet or more, and produces valuable lumber.

In the alpine zone it occasionally forms patches of pure forest, but more often is a constituent of the mixed forests of California red fir, lodgepole pine, and other species which are found in this zone. The development at high altitudes is much inferior to that at lower levels. In the alpine zone it rarely exceeds 50 feet in height or 3 feet in diameter. Its clear bole is comparatively shorter still, and its large crown is borne by branches disproportionately stout. It is also shorter-lived than in the lower zone, 200 years being as a rule the maximum, while in the lower zone it may reach an age of double that.

It grows in all situations and on all soils, or even in crevices between the rocks where soil appears to be absent. Wherever the soil is fairly deep it tends to form forests of considerable density. In other places its occurrence is more scattered.

In its reproduction it proves itself to be a characteristic tree of the alpine zone rather than of the mountain zone. In the latter, although seedlings are present everywhere, they are extremely scattered and are much less numerous than those of any other important tree of the zone. In the alpine zone, on the other hand, they are exceedingly abundant, and form a significant part of the young growth in the alpine forests.

The seed is borne abundantly in the upper zone and sprouts readily in all situations. The rapid growth of the seedlings and their ability to endure both shade on the one hand and drought on the other, are ample warrant that the representation of this species in the future forest of the alpine zone will be adequate.

This species, like all the others of the alpine zone (or, indeed, of any zone in arid California), suffers more or less from fire. In early youth it is not so susceptible as the fir or the lodgepole pine, but in later years, by reason of the resinous quality of its wood, it is comparatively more so. In the mountains of southern California in particular the danger of this species from fire is severe.

It also suffers somewhat from windfall, due both to its habit of growing in exposed situations, and on this soil which affords too feeble a foundation for it.

Lodgepole Pine (Pinus murrayana).

The lodgepole pine is the most generally distributed of all the trees of the alpine zone, occurring on the northern cross ranges, on both slopes of the Sierras, and on the summits of the mountains of southern California. On the northern cross ranges it is generally distributed between elevations of 4,000 and 8,000 feet. In the northern Sierras it ranges about 500 feet higher. In the vicinity of Lake Tahoe on the west slope of the Sierras it occurs between 6,000 and 9,000 feet, occasionally ranging both higher and lower. In the southern Sierras and the mountains of southern California its range is from the 9,000-foot contour up to timber line.

It grows well in all soils and in various situations within its range. It is particularly adapted to the heavy soils on the borders of meadows, and in these situations forms pure stands, often of great density but usually open and park like. Elsewhere it is a constituent of the mixed forests, in which the California red fir predominates. It ranges generally to greater elevations than the latter.

Even in the best situations the tree is usually short and of small diameter. It seldom exceeds 90 feet in height or 3½ feet in thickness. Average diameters are from 1 to 2 feet. The clear bole is always short, and often entirely wanting. It is comparatively short-lived, the oldest tree seldom passing 150 years.

The reproduction of lodgepole, like that of California red fir, is prolific and aggressive. Any soil seems to be good enough for seedlings to take possession of, and having once sprouted they grow rapidly. They are quite tolerant of shade. Having thin bark, lodgepole pine is very susceptible to fire. The tree is sometimes cut for mine timber and fuel.

Knobcone Pine (Pinus attenuata).

This species, the knobcone pine, has a very irregular distribution. It occurs throughout the State, from the Siskiyou Mountains to the San Bernardino, sometimes as scattered individuals, but more often in groups or patches. It is entirely absent over large areas within its general range. It occurs generally in the mountain zone, but is found also with

the chaparral at lower levels. In the neighborhood of Mount Shasta it ranges between elevations of 3,000 and 5,600 feet. In the Santa Lucia Mountains it occurs as low as 2,000 feet.

It is a small tree, usually short, limby, and of no value for lumber. It seldom exceeds 50 feet in height or 1 foot in diameter; and its clear length is rarely more than 10 feet, and more often half of that.

It is an important species, however, in spite of its limited occurrences and scrubby form, because of its ability to thrive on poor and barren sites, and because it reproduces so well after fires. The cones are born very early and are of extreme vitality, persisting on the trees for years without opening and without losing their power of germination. With exposure to heat they open readily, so that after a forest fire or a very dry, hot summer abundant seed is shed.

Digger Pine (Pinus sabiniana).

This is a characteristic tree of the foothills as far south as latitude 34° 30′. At the head of the Sacramento it ranges between 500 and 3,000 feet and in the Sierra Madres and Tehachapi goes up to 5,000 feet. It grows on the dry slopes on all soils and exposures, reaching its best development on the western slopes of the middle Sierras between 1,000 and 2,000 feet elevation. Here it occasionally attains a height of 80 feet and a diameter of 3 feet, although elsewhere it rarely exceeds 40-feet in height by 2 feet in diameter.

Most conifers are excurrent, that is, the topmost bud is a direct continuation of the bole of the tree. This species differs from its class in branching more like a hardwood. The branches are stout and the bole short, rendering the tree unsuitable for lumber. The crown is large, irregular, and very thin, plain evidence of its intolerance of shade, and the large cones are plainly visible through it. It is a prolific seeder, but reproduction, except at the upper limits of the zone, is usually poor. The seeds are edible and often used for food by the Indians.

It grows with a great variety of species and occasionally forms pure stands of limited extent. It does not occur south of Soledad Pass. It is not often cut for lumber, but makes cordwood of fair quality.

Shore Pine (Pinus contorta).

This pine occurs within the shore type as far south as central Mendocino County. It forms generally pure forests of small extent on the sandy soil along the coast. It is not found more than a mile inland.

The patches of pure forest are often so dense that the crowns interlock, but growing in exposed situations the trees are short-bodied, crooked, and branchy.

The shore pine is not a timber tree, and is not often cut even for fuel. Its maximum size on the California coast is about twenty feet by one and a half feet.

Swamp Pine (Pinus muricata).

The swamp pine ranges from central Mendocino County southward to San Luis Obispo County, its range overlapping that of the shore pine in the vicinity of Fort Bragg. Like the latter, it occurs in patches of nearly pure growth and of considerable density. It is found on the sandy soil of the "pine barrens," but prefers low, swampy situations. Its occurrence is very irregular, the patches being widely scattered. In swampy, sheltered localities on the Mendocino coast it reaches its best development, becoming a tree 90 feet high and 3 feet in diameter. The trees are straight, though limby, and the growth decidedly rapid.

Where it is exposed to the wind it develops in much the same manner as the shore pine, being short and misshapen. It reproduces easily. It is not often cut for lumber, but sometimes furnishes cordwood.

Monterey Pine (Pinus radiata).

The Monterey pine occurs "only in a narrow belt a few miles wide on the California coast, from Pescadera to the shores of San Simeon Bay, on the islands of Santa Rosa and Santa Cruz, and on Guadaloupe Islands." Its natural distribution is therefore very limited, but it is widely planted outside of its range in California and abroad, and flourishes remarkably.

This pine reaches its best development on the southern shores of Monterey Bay, where it becomes a tree 100 feet high and 2 to 3 feet in diameter. Occasional trees are much larger. It forms pure, fairly dense stands and grows very rapidly. In general, it is comparatively short-lived. It is not cut for lumber, but is fuel wood of good quality. Its principal value, however, lies in its adaptability to grow where other trees will not.

Torrey Pine (Pinus torreyana).

This pine occurs only in a small area on the coast at Del Mar near San Diego. Its usual height is about forty feet and its diameter about one foot. In situations exposed to strong sea winds it is shorter, and the crown sprawls to leeward. Although of slow growth, it is sometimes planted in such situations to prevent the drifting of sand. The crown is large and the bole correspondingly short. It is of no commercial importance, and is interesting chiefly from a botanical point of view.

Redwood (Sequoia sempervirens).

Within its general range the occurrence and development of the redwood are governed by soil moisture. It prefers a deep, fresh, well drained soil, with plenty of humus. The trees on the slopes are smaller, and on upper slopes with south or southwest exposure the species may be entirely absent. Outside of the redwood belt proper, as in Napa and Monterey counties, it is confined to moist spots in sheltered canyons.

Under normal conditions of growth the redwood develops a long, cylindrical bole, clear for two thirds of its length, and surmounted by a narrow, tapering crown. Exceptional trees have measured 350 feet in height and 20 feet in diameter, and the age of some of them has been computed to be nearly 1,500 years. It is the tallest tree of North America, and is exceeded in diameter only by the big tree of the Sierra, a near relative.

Average dimensions of the trees customarily logged are 200 to 275 feet in height, and 3 to 10 feet in diameter, and their ages run from 400 to 800 years.

In early life the redwood grows rapidly both in height and diameter. Later, the growth falls off, and in old age is extremely slow. Instances are not rare of an old redwood increasing in diameter only 6 inches in the last 300 years.

Though a fairly prolific seed bearer the redwood rarely reproduces itself by a seed. It sprouts readily from the stump and root-collar, and suckers from the roots; and it is probable that the majority of trees now forming the forest originated in this way. The sprouts, in plenty of sunlight, grow with extreme rapidity, and are apparently as long-lived and as cylindrical in shape as the seedlings. This is ordinarily not the case with sprouts; but the redwood presents many anomalies, chief of which, perhaps, is its ability to sprout at all, a property denied to conifers in general; and there is abundant evidence that redwood sprouts reach an extreme age and size. The ordinary method of occurrence on the flats is in groups, roughly circular in shape, with the largest tree in the center, from which the others evidently sprouted. Or the parent tree may have blown down and disappeared, leaving only a hole in the earth and a ring of enormous progeny to show that it ever existed. The seedlings are of slower growth than the sprouts and require more sunlight.

The tree has very few enemies, and is well protected against them. The thickness of its bark makes it invulnerable to all but the hottest fires, and its wood, also, containing no resin, does not burn easily. Very few fungous diseases are dangerous to it, although, to be sure, certain fungi occasionally attack the roots. The great height of the trees invites the lightning and gives the wind a leverage; but thunderstorms are infrequent in the country where it dwells, and the broad, funnel-shaped roots anchor it firmly against all but the strongest winds.

The vitality of the tree is also remarkable. It not only lives to an astonishing age, but after being cut it sprouts repeatedly, using the quantities of nourishment stored in the enormous roots. And although successive fires will finally kill the stump, it will remain in the soil indefinitely without rotting. Abundant sunlight is necessary to induce rapid growth, but a suppressed tree will drag out a miserable existence

for years without dying, and when finally the shade is removed will recover completely. Lack of moisture, however, it can not endure; and the fact that many of the oldest and tallest trees are spike-topped or stag-headed is to be explained on the ground of the sensitiveness of the tree to drought. Most of the winds that reach the redwood are moist and beneficent, but during the space of time that the life of a mature redwood tree represents, it is certain that some drying winds must have occurred, particularly at the higher altitudes, and that one of these, at least, was of such seveity as to kill the topmost branches.

The lumbering of redwood is attended with great destruction of timber. The tree is both heavy and brittle, and it is seldom felled without loss of a considerable portion of its merchantable contents. The bark must be removed, and this, together with the limbs and broken top, makes a confused mass of débris about the log which is cleared away by means of fire. By this the logs are made accessible and easy to haul out, and a comparatively small number of them are consumed, but broken pieces that might go into shingles, etc., are usually lost. The logs are hauled from their places one at a time by means of donkey engines to a skidway. Several together are then hooked on to an endless cable and hauled either directly to the mill or to a logging railroad where they are piled on bunkers or flat cars and thence hauled to the mill.

Most of the small trees are either destroyed by the fire or injured during the snaking of the logs, and the consequence is that a redwood slashing is a scene of almost complete desolation. Yet it is difficult to suggests a practicable remedy. Owners of redwood timber land would be glad to put a stop to all unnecessary waste, but the cost of logging is already high, and anything that added greatly to it would be certain to be looked on with disfavor.

The practice of burning slash is very general in the redwood country and is not necessarily a bad thing. The bark being thick and gritty heats the saw to such an extent that it must be removed before the logs go to the mill, and if left unburned would, together with the tops and other débris, make a fire trap that would prove dangerous even in the humid redwood belt. Experiments must be carried on before the value of logging without burning slash can be determined with any exactness. In the mean time, assuming that slash burning is a necessity, it seems certain that the bad results of it can be obviated to some extent by a more careful handling of the operation. Especial care should be taken to prevent the escape of fire from the areas which particularly require burning to those that were burned over during the previous season. The redwood sprouts readily from the stump, and even after the burning a fair reproduction usually follows the logging, and would, if protected, have a considerable future value. The new sprouts, however, are likely to be destroyed by successive fires which continually run over

lumbered land, and finally the stumps lose their power of sprouting and the area is seeded up to brush. Large areas about Fort Bragg, for example, might easily have been stocked with redwood second-growth, but are now covered with worthless California lilac or blue-blossom (*Ceanothus thyrsiflorus*). Such areas are hopeless for the present. All this might be prevented if the area after having been burned over once were protected from future fires and the young sprouts allowed to grow up.

Considered as lumber, redwood second-growth has hitherto had little standing with lumbermen. Even when the young trees reach merchantable size their wood is considered brashy and inferior. In consequence, redwood production is not considered a thing to be striven for, and if cut-over land can be converted to any use other than growing a new crop of redwood, the practice is to do it. The stumps are exceedingly long-lived and difficult to remove, and the plowing of redwood land is almost impossible, but it may be seeded up to grass, and this is often done. A much better plan, however, would be to grow redwoods. The following tables taken from a bulletin of the United States Forest Service show the possibility of redwood second-growth:

MERCHANTABLE YIELD OF REDWOOD PER ACRE.

Diameter breast-high.	CRESCENT CITY.		ARCATA.	
	Average number of trees per acre.	Merchantable yield.	Average number of trees per acre.	Merchantable yield.
Inches.		*Board feet.*		*Board feet.*
14	17.7	920.4	13.5	702.0
16	6.0	444.0	7.0	518.0
18	2.7	291.6	4.4	475.2
20	1.5	234.0	2.0	312.0
22	1.0	188.0	1.1	206.8
24	1.0	267.0	.5	133.5
26	.3	129.0	.2	86.0
Totals		2,474.0		2,433.5

PILE LENGTH OF REDWOOD.

Diameter breast-high.	Pile length.	Diameter breast-high.	Pile length.
Inches.	*Feet.*	*Inches.*	*Feet.*
18	30.5	24	49.0
19	33.5	25	52.0
20	37.0	26	54.5
21	40.0	27	57.5
22	43.0	28	60.0
23	46.0		

MERCHANTABLE VOLUME OF REDWOOD TIMBER.

Diameter breast-high.	Merchantable volume.	Total height.	Diameter breast-high.	Merchantable volume.	Total height.
Inches.	*Board feet.*	*Feet.*	*Inches.*	*Board feet.*	*Feet.*
14	52	69	21	186	88
15	62	72	22	188	91
16	74	75	23	226	93
17	90	78	24	267	95
18	108	81	25	316	97
19	130	83	26	430	99
20	156	86	27	496	101

Incense Cedar (Libocedrus decurrens).

Throughout the State the incense cedar is a typical tree of the middle zone, forming 10 to 30 per cent of the forest. Although a second or third class tree from a commercial point of view, it is nevertheless important silvically on account of its numbers and its capacity for adapting itself to its surroundings. It occurs in all conditions of soil, slope, and exposure, doing equally well on dry, gravelly south slopes, and in the fresh soil of the canyon sides, and reproducing prolifically everywhere. At middle elevation in the southern part of its range it forms 20 to 30 per cent of the forest, and occasionally patches contain even more.

Although it reaches a diameter of 7 feet, the bole is very tapering, and it seldom exceeds 100 feet in height. The crown is long and straggling, and as likely as not to be minus a top. The branches, too, are brittle and often broken by the wind. The whole appearance of the mature tree suggests decrepitude and unsoundness, and one is not surprised to learn that the majority are shot through and through with fungous disease. Its usual term of life is 100 to 200 years, although occasional older trees may be found. It is not wind-firm, and suffers severly from fires. Its rate of growth is uneven, but fairly rapid.

If it were not for its power of reproduction, such a tree would fare ill in competition with a tree like yellow pine; but it bears abundant seed, is not fastidious regarding seedbed, is capable of enduring considerable shade, and makes fairly rapid growth. These qualities are sufficient to give it a good start, and although the trees reach maturity and die sooner than most of the other species with which they grow, they nevertheless remain long enough to provide abundantly for young growth to take their place when they succumb.

Only a small quantity of incense cedar is cut in lumbering. The taper of the bole is such as to make the amount of lumber obtained disproportionate to the labor of getting it out. Besides the wood, though valuable, is almost always unsound. It splits easily, however, and lasts well in the ground, and is largely used for posts and rails.

Ordinary lumbering operations always favor the inferior tree at the expense of the superior, and in this case the cedar is favored. But for the happy circumstances that yellow pine is also an active reproducer, and that cedar is short-lived, the future middle zone forest might consist chiefly of the latter species, and yellow pine share the destiny of sugar pine.

Tideland Spruce (Picea sitchensis).

This species is an unimportant member of the redwood flora, growing only near the coast on rich, moist, or even swampy land, particularly near the mouths of streams. Its wood is very valuable, being white and soft, but the boles are seldom clear for any considerable distance and the lumber is usually knotty. Further north, where it occurs abundantly, it is largely cut for pulpwood, but in California the stand of it is too light and scattered to furnish material for any special industry, and in development it is also inferior. It does not occur south of Mendocino County.

In California it seldom exceed 100 feet in height or 4 feet in diameter, and is often limby to the ground. It grows rapidly and reproduces fairly well. The seedlings are tolerant of shade, but demand rich soil in which to sprout.

The species is extremely sensitive to fire, owing to the thinness of its bark, and is not wind-firm; but occurring as it does on damp flats and in canyons, it is not often troubled by either of these enemies of the forest.

Western Hemlock (Tsuga heterophylla).

Hemlock is an inhabitant of flats near the coast from Sonoma County northward. South of Humboldt County it is rare, and nowhere within the State is it commercially important. In Del Norte County the heaviest stands occur, and the best individual development is reached; but the optimum region of this species is in Oregon and Washington.

In California it is associated with Sitka spruce, lowland fir, Port Orford cedar, redwood, Douglas fir, laurel, alder, etc., forming a small percentage of the stand. It grows to a height of 200 feet and a diameter of 6 feet, but these dimensions are rare. It is usually limby, containing little clear lumber.

Red Cedar, Arborvitae (Thuja plicata).

This cedar ranges from Mendocino County northward along the coast, extending inland along canyons to the slopes of the Siskiyous. Its occurrence is scattered, and it never forms the pure forests in California that it does in the vicinity of Puget Sound.

It reaches a height of 200 feet and a diameter of 15 feet, but its bole is so tapering that the merchantable lumber it contains is all out

of proportion to these dimensions. Being a tolerant tree, it is long-crowned, but occasionally has a clear length of 60 feet or more. Its reproduction is scant and generally of slow growth.

Port Orford Cedar (Chamaecyparis lawsoniana).

Port Orford cedar occurs in California near the coast in Del Norte County and in canyons in the Trinity Mountains in Siskiyou and Shasta counties. It demands a rich soil, with a moist climate, and it occurs at its best in swampy situations near the sea, growing with lowland fir, hemlock, Sitka spruce, and occasional redwood, Douglas fir, and laurel. It rarely forms any considerable proportion of the forest.

In form it is very conical, tapering rapidly from a strongly buttressed base. It reaches a height of 175 to 200 feet and a diameter of 6 to 12 feet. Its clear length is seldom more than one third its total height.

Although very scattered, it is much sought after by lumbermen, for its lumber is particularly valuable. It is white, close-grained, durable, and very fragrant. It is tolerant of shade when young, but reproduces sparingly.

Monterey Cypress (Cupressus macrocarpa).

Like the Monterey pine the Monterey cypress has an extremely restricted natural distribution, but is widely introduced. Its natural range is "coast of California south of the bay of Monterey, occupying an area of about two miles long and 200 yards wide from Cypress Point to the shores of Carmel Bay, with a small grove at Point Lobos." It is planted throughout the Pacific coast and abroad.

It becomes a tree 70 feet high and 3 feet in diameter, or occasionally larger. It is short-bodied, of no value for lumber, and but little for fuel, but it serves admirably for wind-breaks and hedges.

Pygmy Cypress (Cupressus pygmaca).

This is a very small tree, scarcely more than a shrub, with a very limited distribution on the Mendocino coast. It occurs scattered among the other species of the shore type.

Yew (Taxus brevifolia).

The yew, although widely distributed within the coast zone and in the mountain zone as far south as the southern Sierras, is of comparatively rare occurrence and of little importance. It seldom exceeds 40 feet in height or 1 to 1½ feet in diameter. These dimensions are reached in moist, cool situations in the canyons of the north coast. It grows very slowly, enduring dense shade.

Nutmeg (Tumion californicum).

The nutmeg has much the same range as the yew, occurring throughout the coast zone and in the mountain zone on the west slopes of the Sierras. It is even more rare than the latter, and is equally unimportant. In the northern coast canyons it sometimes becomes a good-sized tree, but is ordinarily no more than a shrub. It grows slowly in the dense shade of the coast forest.

Douglas Fir (Pseudotsuga taxifolia).

The region of maximum development of Douglas fir is north of California on the west slopes of the Cascades in Washington and Oregon. In California it is found throughout the coast zone; within the mountain zone it occurs on the Sierras as far south as the vicinity of Mount Whitney, and in the coast ranges to the Santa Lucia Mountains. It becomes of less and less importance from north to south and is finally replaced on the southern coast ranges by its relative, the bigcone spruce (*Pseudotsuga macrocarpa.*) It prefers cool, moist situations. In the redwood belt it occurs especially on lower slopes, and on upper slopes as a rule only when they have north or east exposure.

In the Trinity, Scott, Siskiyou, and Yola Bola mountains, that is to say, in the northern cross ranges, it occurs between elevations of 2,000 and 5,500 feet, sometimes reaching 6,000 feet; and it has much the same altitudinal limits throughout its Sierra range. Its best development on the Sierra occurs between 3,000 and 5,000-foot elevation. On the Santa Lucia Mountains it occurs between 2,000 and 3,000 feet. It is not found on the Warner Mountains or on the mountains of the desert.

In the coast zone the Douglas fir associates chiefly with redwood and tanbark oak, and in the Douglas fir type occurs nearly pure. Throughout the Sierras its occurrence is scattered, and it rarely forms more than 5 per cent of the forest, which is mostly composed of yellow pine, sugar pine, incense cedar, and white fir. It grows best on moist situations on well-drained, loamy soil.

The largest trees are between 150 and 180 feet high and 3 to 6 feet in diameter. Occasional specimens reach a height of 200 feet and a diameter of 8 feet, but these are exceptional. The tree does not prune itself easily. In close stands the boles may be clear for one third to nearly one half their length, but in open stands stout limbs are borne to within a short distance of the ground.

The age seldom exceeds 400 years. Within the Douglas fir type of the coast zone reproduction is excellent. Cones are borne in abundance and apparently every year; and the seedlings to the number of 33,105 per acre were found, with an average age of 11 years, and average height of 3½ feet. Near by a 36-year-old stand was found containing 1,068 trees per acre, 3½ inches in diameter and 45 feet high. The boles were

not clear, but the lower branches were dead to a height of 12 feet from the ground. In this fashion, reproduction fills up the openings in the Douglas fir type of the coast zone, wherever fires have been kept out.

In the northern Sierras reproduction is also good, excellent sapling stands occurring on cut-over areas. Further south it is much less satisfactory. Here Douglas fir succeeds badly in competition with yellow pine and incense cedar, and seedlings are frequent only on the slopes of canyons. The production of seed is also scant, and seed years occur at comparatively long intervals.

The seedlings are tolerant of shade in all situations, differing remarkably in this respect from the Puget Sound. Seedlings of Douglas fir are extremely sensitive to fire, and up to 30 years of age the lightest ground fire is apt to be fatal. The older trees are protected by thick, corky bark, and are less vulnerable.

In the coast zone, and in the northern Sierras, Douglas fir will probably form an important part of the future forest. In eastern Humboldt County it is already reclaiming large areas of open land where fires have been kept out; and in the northern Sierras a promising reproduction ordinarily follows logging. Southward, on the contrary, reproduction does not keep pace with the cutting, and the probability is that the representation of Douglas fir in the future forest will be small.

Bigcone Spruce (Pseudotsuga macrocarpa).

The bigcone fir (more commonly called bigcone spruce) replaces Douglas fir in the coast ranges south of Santa Barbara. As a timber tree it is not of the first importance. Average mature trees are 3 to 4 feet in diameter and about sixty feet in height, occasional trees reaching 80 feet. The bole is seldom clear for more than 30 feet, and the crown is large with stout limbs. It grows usually in extremely open stand either pure or with other species. At the lower levels it occurs with knobcone pine and coulter pine, both trees of insignificant value for lumber. Above it mixes with yellow pine, sugar pine, and cedar.

Lowland Fir (Abies grandis).

The lowland fir extends along the coast from Sonoma County northward into Oregon and Washington. It grows best in moist situations, forming patches of pure forest on flats where the standing water prevents the growth of redwood and red fir; and it occurs to some extent on the lower slopes. It rarely forms a large percentage of the forest, and is at present of small importance from a commercial point of view. It becomes a large tree with a straight cylindrical bole 150 to 200 feet in height and 3 to 4 feet in diameter. The crown is rather long. It is able to endure very dense shade, and under favorable circumstances grows rapidly. It reproduces abundantly on rich soil even in the dense forest,

and in openings in the forest cover the thickets of seedlings are very dense.

White Fir (Abies concolor).

White fir is found throughout the State wherever the middle zone is present, except in the Santa Lucia Mountains. It occurs principally at the upper elevations within the zone and ranges from 500 to 1,500 feet higher, into the alpine zone. In the northern cross range and the northern Sierras it occurs between elevations of 3,500 and 7,500 feet. In the southern Sierras and the mountains of southern California it lies between 6,000 and 9,500 feet, descending to 5,000 feet occasionally on north slopes. It is everywhere an important tree, but its preference is for cool, moist situations and in these it is often predominant. At its best it grows in dense stands in which the soil is so shaded that underbrush is prevented from growing. It is tall and slender, with long, narrow crown and clear length of from 40 to 60 feet. It reaches a height of 175 to 200 feet and a diameter of 3 to 6 feet. At high altitudes its average height is about eighty feet. Its rate of growth is fairly rapid, and it attains an age of 300 to 400 years. Although it produces little seed and that only at intervals, and requires moist, cool situations in which to sprout, its reproduction is in general very good, owing to its ability to endure shade. In particularly favorable spots throughout the middle zone, but particularly in the northern Sierras, the proportion of white fir in the reproduction is often as large as 80 to 90 per cent. It is logged much less closely than sugar or yellow pine and this circumstance also gives it the advantage. The young trees are extremely sensitive to the slightest fire, however, and promising reproduction is often destroyed by this means.

Inability to withstand scorching is also characteristic of the mature trees. The bark is very thin, and, being resinous besides, offers less than no protection to the tree. The leaves also are very inflammable, and crown fires in this species are not uncommon. The immediate results of fires in a white fir forest are bad enough, but the ultimate effects are worse yet. The white fir forest is usually extremely dense, containing little undergrowth. When it is destroyed by fire, however, it is usually seeded up promptly to chaparral. Provided a few seed trees escape, scattered seedlings may spring up among the chaparral, and they grow well beneath its shade. But the débris of the fallen fir trees is almost sure to invite other fires, and the chance of the seed trees ultimately surviving is very slight indeed. The reproduction they have secured is killed along with the chaparral, but the latter sprouts readily and the supply of fir seed being cut off the chaparral usually takes undisputed possession of the soil. This is the origin of many chaparral fields in the Sierras which are naturally prime forest land, but which now contain no

trees, only acre after acre of chaparral of no value at all for timber, and immeasurably inferior to the fir forest as a conserver of water. White fir is less desired by lumbermen than sugar pine, yellow pine, or Douglas fir, but nevertheless is cut to some extent. It makes good pulp wood.

Abies venusta, a relative of the white fir, occurs only in the Santa Lucia Mountains, where it exhibits characteristics very similar to those of the latter.

California Red Fir (Abies magnifica).

The California red fir is the principal, if not the only, timber species in the alpine zone. It occurs in the northern cross ranges and on the Sierras throughout. It is not found on the mountains of southern California. On the northern cross ranges it is generally distributed above 5,000 feet, and on Mount Shasta it occurs between 5,500 and 8,000 feet, extending up as far as 8,900 feet on exceptional slopes. In the middle Sierras, about Lake Tahoe, its general range is about 500 feet higher, or between 6,000 and 8,500 feet, and toward its southern limits it ranges up to 10,500 feet.

It is not a timberline tree, but reaches its best development on the west slopes of the Sierras, near the lower levels of the zone, on protected slopes with deep soil. Here it forms pure forests of great density and of considerable extent. In less favorable situations the fir is associated with lodgepole pine, Jeffrey pine, white pine, and black hemlock, the fir still forming the most important constituent of the forest. The mixed forests are more open than those of pure fir.

In the region of its best development it forms straight cylindrical boles, clear for 40 to 60 feet, and reaching a maximum diameter of 5 feet. Average dimensions are 2 to 3½ feet diameter, and 100 to 140 feet height. Occasional trees attain a height of 175 feet. Above the optimum region the trees are smaller, the boles very tapering, and the crown comparatively longer. A noticeable characteristic of this tree is the curvature of the bole near the ground, caused by the weight of snow bending the seedlings. After the bole becomes stouter and stiffer it is able to support the snow without bending under it, and the tree grows straight henceforth, but the deformity acquired in its early years is permanent.

The California red fir produces seed abundantly, and at short intervals. The seedlings are not fastidious regarding their seedbed, bear shade well, and grow rapidly, forming thickets of exceeding density. The wood is generally sound and fairly durable, though of coarse grain.

The tree has no important enemy but fire. The young trees are particularly susceptible, having thin bark and inflammable foliage. Later in life the bark becomes thick and offers more resistance, and the leaves

are too high up to be reached by a surface fire. But in early life the trees are entirely without protection and succumb easily.

Although so easily destroyed, the reproduction is aggressive, and competes with the chaparral for growing space with great pertinacity; but when once a fire has occurred the litter is almost sure to invite a second, and the final destruction of seed trees usually leaves the chaparral in undisputed possession.

A very beautiful variety occurs in the neighborhood of Mount Shasta, the so-called *Abies magnifica shastensis.*

BROAD LEAF SPECIES.

California Black Oak (Quercus californica).

The California black oak is found at middle elevations throughout the State. It rarely occurs pure, but forms an understory to the coniferous forests of the middle zone, especially yellow pine. In the northern and middle Sierras it ranges between 1,000 and 6,500 feet, ascending in the southern Sierras to 8,000 feet. It is especially partial to canyon sides and rocky ravines, and in general prefers moist soil, although not particularly fastidious.

On the lower McCloud it forms an open woodland of nearly pure growth. Elsewhere it is a part of the mixture, forming from 5 to 10 per cent of the stand, and occasionally 50 per cent on limited areas. These stands are always open, and the trees are characteristically short-boled and limby.

The black oak reaches a height of 40 to 50 feet and a diameter of 2 to 4 feet. It is comparatively short-lived for an oak, having an average age of 150 to 200 years.

It grows fairly rapidly in the sunlight, but will not endure shade. It bears seed in abundance, and reproduces persistently. Young seedlings sprout repeatedly after being burned, and if fires do not follow each other with two great frequency, the sprouts serve as nurses for the more valuable species. They are, besides, comparatively fire resistant, even at an early age, and the old trees are rarely killed outright. They are hollow-butted, however, often with broken tops, and easily thrown by the wind. The wood is valuable for fuel, but is not cut for lumber.

California Rock Oak (Quercus douglasii).

Blue, mountain, or rock oak (*Quercus douglasii*) has the same general distribution range as the gray pine, but at slightly lower elevations. It ranges between 200 and 1,500 feet at the head of the Sacramento Valley and ascends to about 4,000 in the southern Sierras and the Sierra Madres. It is an important associate of the gray pine, and

together they form the largest part of the forest growth in this belt. In the deeper, richer soil of the slopes and valleys it occasionally reaches a height of 90 feet and a diameter of 4 feet. At elevations of 500 to 1,000 feet in the middle Sierras its ordinary size is 25 to 40 feet by 1 to 2 feet.

It is short boled and large crowned, and does not furnish saw timber, although it is in demand for firewood. It often forms pure stands, but is usually associated with the preceding and with *Quercus lobata* and others of less importance.

Its reproduction from seed is usually scanty, and although it sprouts from the stump when young most of the trees cut are too old to reproduce satisfactorily in this way. It requires abundant sunlight.

California White Oak (Quercus lobata).

This species is distributed like the rock oak and digger pine, but at still lower elevations. In the deep soil of the upper Sacramento it reaches its best development, individual trees attaining a height of 100 feet and a diameter of from 6 to 8 feet, growing often in open groves without admixture of other species. Toward the north it ranges from the level of the valley up to 1,500 feet, mingling at its upper limits with rock oak and digger pine. Near the southern limits of its range just north of Soledad Pass it ascends to 4,500 feet.

It is the largest of the white oaks in California, but does not furnish saw timber. The bole is short and the crown heavy. It is used for firewood, but is inferior to the rock oak. It sprouts from the stump when young, but loses the power with age. Its seedling reproduction is generally scant.

Tanbark Oak (Quercus densiflora).

This species is silvically and economically one of the most important associates of the redwood. It is widely distributed on the coast ranges as far south as the Santa Ynez Mountains, and on the west slopes of the Sierras up to an elevation of 5,000 to 6,000 feet. It reaches its best development in the northern part of the coast zone in Humboldt and Mendocino counties, growing on the slopes with redwood and red fir. Here it attains a maximum height of 125 feet, and forms a straight, cylindrical bole clear for two thirds of its length. Further inland the proportion of conifers grows less and more hardwoods come into the mixture, especially madrona and black oak. In the forest the tanbark oak assumes a more characteristic hardwood form, with shorter bole and broader crown.

On the Sierras the oak rarely exceeds 30 feet in height, and in hot, dry situations is reduced to a shrub. It never occurs in pure stands, although in the hardwood type it forms a very large proportion of the forest.

It reaches an age of 100 to 150 years. Although seed is born in abundance, it rarely has an opportunity to germinate. The species sprouts vigorously, however, after the manner of the redwood, the sprouts attaining very large dimensions. They are sent out from healthy standing trees quite as readily as they are from trees injured by fire or from the stumps of trees cut for bark, and from old trees as well as young. Reproduction in circles is common in the case of tanbark oak, as it is with redwood. The sprouts are very tolerant of shade, and grow rapidly.

It resists fire well, is subject to few insect or fungous diseases, and is not often thrown by the wind. From its silvical characteristics, therefore, it is well adapted to management, and in spite of the fact that an enormous amount of it is cut for bark annually, its future would be safe but for two circumstances, namely, the débris left by the bark-peelers and the practice of peeling the stump.

The value of the tree is mainly in its bark. The wood is considered of little value except for fuel, and as cordwood can not be hauled profitably from as great distance as the bark which is peeled from it, the naked bodies of the trees are ordinarily left in the woods. These becoming dry and inflammable burn fiercely when ignited, and the reproduction which has followed the cutting is destroyed.

The most valuable bark is also the thickest, and this is found at the very base of the tree below stump-height. The stripping off of this bark prevents sprouts from forming on the stump, and hinders reproduction materially.

Another circumstance that hinders reproduction is the fact that the trees are necessarily cut in the spring and early summer when the bark will peel. This is exactly the time of year when the sprouting capacity is the smallest.

It can hardly be remedied, however, for the expense of peeling bark in the winter or early spring would be prohibitive; and the reduction of the débris must wait until the wood has more value than it has at present. The practice of peeling the stump, however, can be stopped with little present loss, and with immense advantage to the future forest, and it should be discouraged.

Chinquapin (Castanopsis chrysophylla).

The chinquapin occurs throughout the coast zone and very generally throughout the mountain zone also. It reaches its best development in moist, cool situations with rich, fresh soil in the northern coast zone, where it becomes a tree 100 feet or more in height and 2 to 4 feet in diameter. On the Sierras and southern mountains it is usually a shrub forming a small proportion of the chaparral.

In the region of its best development it is associated principally with

tanbark oak. It is of little commercial importance, and is seldom cut except where bark-peelers mistake it for tanbark oak.

California Laurel (Umbellularia californica).

The California laurel occurs throughout the coast ranges and within the foothill zone on the west slopes of the Sierras. It reaches its best development on flats along the large streams in the coast zone, especially in Humboldt and Del Norte counties. Over small areas in these situations it occurs nearly pure, but it associates with redwood, red fir, hemlock, lowland fir, Port Orford cedar, Sitka spruce, tanbark oak, alder, and maple. Near Pepperwood, on the Eel River, a splendid stand of it formerly existed, but it has recently been cut for cabinet lumber. This forest yielded 5,000 feet to the acre and sold for $40 per thousand.

In the region of its best development the laurel becomes a tree 80 to 100 feet high and 4 to 6 feet in diameter. Its clear length is comparatively short and its crown is massive. In the San Gabriel and San Bernardino mountains it follows the streams at the lower elevations, occasionally reaching a diameter of 2 feet. Where it occurs on the dry hillsides it is reduced to a mere shrub. It reproduces fairly well, and is decidedly tolerant of shade.

Madrona (Arbutus menziesii).

The madrona is widely distributed in the coast mountains, and occurs on the west slopes of the Sierras and on the San Bernardino Mountains. In the northern coast zone, where it reaches its best development, it is found on the slopes with redwood, red fir, tanbark oak, or black oak. It sometimes attains a height of 90 to 100 feet and a diameter of more than 4 feet. Usually it is much smaller, and in dry situations is reduced to a shrub. Its trunk is ordinarily short and eccentric in cross-section. Its wood is used somewhat for furniture and largely for charcoal. It is also cut for cordwood, making a hot, quick fire.

Alder (Alnus oregona).

Alder is common throughout the coast zone, and occurs southward in the canyons to the Santa Ynez Mountains. It is found always in moist situations, being particularly frequent about springs. Toward the northern part of its range it occurs in small patches sometimes nearly pure, or oftener with laurel, forming a dense cover.

In California it reaches a size of 15 inches by 60 feet. It is sometimes cut for firewood, but is generally unimportant.

Oregon Maple (Acer macrophyllum).

The Oregon maple is very generally distributed throughout the coast zone, and on the Sierras and southern mountains occurs along streams up to an elevation of 2,000 to 5,000 feet. It is in general a small and unimportant member of the forest. In canyons of the northern coast

zone it attains a height of 30 to 50 feet, and a diameter of 1 to 1½ feet, but is usually smaller. It is seldom cut for any purpose.

Vine maple (*Acer circinnatum*) and mountain maple (*A. globrum*) in the alpine zone occur along the north coast, but these are never more than shrubs.

Oregon Ash (Fraxinus oregona).

This ash occurs throughout the coast ranges and on the Sierras to between 2,000 and 5,000 feet elevation. It is partial to moist situations with fresh, rich soil, and it grows best on the river flats in the northern part of its range. Here it becomes a tree 60 to 80 feet high and 2 to 3 feet in diameter. In California it is a highly subordinate species.

Black cottonwood (Populus trichocarpa).

The black cottonwood is found in canyons in the coast ranges and on the slopes of the Sierras, from the northern boundaries of the State as far south as the San Bernardinos. It is a moisture-loving tree, and on this account its range is much interrupted. It occurs by single trees or in groups of small extent. In particularly favorable situations, as on the margins of lakes and on the flats at the bottoms of broad canyons, the groups are large, dense, and nearly pure. The usual associates of the species are alder, live oak, incense cedar, and Douglas fir.

It reaches its best development farther north in Washington and Oregon, where its dimensions give it the distinction of being the largest hardwood of the Pacific coast. In California its ordinary dimensions are 25 to 40 feet, height, and 8 to 24 inches, diameter. It develops a broad crown with stout limbs and rather short stem. It is of comparatively little value for lumber, but is cut to some extent for cordwood.

DESERT SPECIES.

The following species occur principally in the desert region of the southeast, but occasionally stray into the foothill zone. They are of little importance commercially, being unfit for timber and generally unfit even for fuel, but are of botanical interest merely. They are mostly members of the *Leguminosæ* family.

An exception to the general run of these desert species is the mesquite, which is an important source of firewood in the desert. Its location near springs makes it convenient, and its tough wood and roots hold fire well. Of next highest importance is, perhaps, the tree yucca (*Yucca arborescens*). It occurs throughout the Mohave Desert and on the slopes of the mountains of southern California, mingling occasionally with *Pinus quadrifolia* or *Pinus monophylla*. It is of little value. The others are: *Celtis occidentalis, Cercis occidentalis, Parkinsonia microphylla, Cercidium torreyanum, Dalea spinosa, Olneys tesota, Canotia holacantha, Chilopsis linearis,* and the tree palm, *Washingtonia filamentosa.*

CHAPTER II.

FOREST PROBLEMS.

Protection.

"The forest is the most highly organized portion of the vegetable world. It takes its importance less from the individual trees which help to form it than from the qualities which belong to it as a whole. Although it is composed of trees, the forest is far more than a collection of trees standing in one place. It has a population of animals, insects, fungi, and plants peculiar to itself, a soil largely of its own making, and a climate different in many ways from that of the open country."

In the forest, because of the crowded conditions, the struggle for existence and for supremacy is very noticeable. Each species of grass, shrub, and tree is doing its utmost to crowd out its neighbor in order to reproduce itself and extend the range of its kind. All living species have individual characteristics which fit them to enter into the competition, giving them some advantage over the others; otherwise they would become unfit and would soon become extinct. In this way many of our now common plants would no longer exist were it not for the fact that the elements of nature and the members of other natural kingdoms had not come to the rescue. In this particular way fire, animals, insects, and man play an important part.

Man has carefully sorted out the species in the vegetable kingdom which are of most value to himself, and has exerted his energy in protecting them from the inroads of enemies at the expense of those species which are of lesser value. He is endeavoring to make these chosen species produce to their maximum through the use of the laws of nature.

The chief product of the forest is lumber, and from the standpoint of forestry it is considered the crop of the forest. The crops of the farmer are harvested—that of the forester lumbered, and so, since it is the object of the farmer to protect his stands of corn and wheat from the inroads of weeds, fire, and other enemies, and to make them produce to their maximum—the forester has the same object with reference to his forest.

The problem of forest protection is, therefore, of great importance, because the climatic conditions expose our forests to the great danger of fire; and there are other sources of loss, such as insects, squirrels, poisonous smoke from smelters, and, through ignorance and mismanagement, man himself. Fire is the most serious of all, and for that reason will receive first attention.

Fire.

For the last few months some sentiment has been created by a few men against the practice of patrolling and preventing forest fires from raging through the forests of the State. The theory is advanced that the forest area should be burned over at frequent intervals, referring to the example set by the Indians as a means of protection.

The short-sightedness of such a theory is quickly revealed when we stop to consider that there is something more to be considered than the standing saw timber. Those who are practicing forestry are bending their efforts, with a marked degree of success, towards the protection of the young, growing trees which are developing into valuable saw timber as well as the protection of the matured timber from destruction and waste by fire.

If the present stand of matured timber were the only thing to be protected, the problem would be easy and the scheme mentioned above might work. But the problem confronting the lumbermen and the foresters of this country is more than the protection of standing matured timber. The problem is to prevent the land on which these valuable forests are now standing from becoming ultimately a barren waste.

When one stops to realize that a yearling pine or fir tree is no larger than a match and is so tender that the heat from a fire no larger than that made by a burning pine needle will kill it; when it is considered that a three-year-old tree will be killed by the heat thrown out by three pine needles burning at its base, the advisablity of burning over the forest floor is less apparent. How can we burn over the forest areas of the country at frequent intervals and at the same time provide for the development and growth of the young trees which should take the place of the saw timber we are consuming?

In two hundred years from now lumber will be just as much in demand as at present, if not more so. There are no new forests to draw upon. We must leave our forest lands in such a shape that our mills can return to these self-same lands for a second, a third, and innumerable cuts in the future. Such a thing is possible, but not through the agency of fire, even as a servant, applied in the manner recommended by a few, because the growing stock and the nucleus of the future stand has not been considered in their protective measures.

California, in common with other states in possessing extensive areas of timber land, suffers an enormous annual loss from forest fires. These losses fall under the three main heads of damage to standing and felled timber, mills, and logging machinery; destruction of young growth and seed trees, and of the producing power of the soil; and injury to drainage basins by the burning of the forest or brush covers. The first two forms of loss are common throughout the forests of the United

States; the last is particularly important in California and other Western states where the mountain forests perform a function of the highest value in relation to the water needed for irrigation, power, and domestic purposes.

Secondary results of forest fires in California are the conversion of original timber lands into chaparral, exposure of the soil to leaching and erosion, the silting of reservoirs and irrigation canals from fire damaged watersheds, and changes in forest composition, usually from desirable to undesirable species.

For convenience in presenting the forest fire problem, the forested and brush covered portions of the State are roughly divided into three regions. This division is purely arbitrary, but the marked diversity in climate, topography, and cover greatly influences the character and effect of the forest fires, and makes a regional differentiation possible and helpful. Each region is discussed independently under the several headings into which the fire question naturally falls. These three regions are designated as: Southern California, Northern California, and Redwood Belt.

SOUTHERN CALIFORNIA.

The region treated under this heading includes the coast ranges south of San Francisco Bay and west of Salinas Valley, exclusive of the redwood lands, and the country south of the Tehachipi Mountains, comprising southern California proper. The forest fire problems are obviously limited to the forest and brush covered foothills and mountains, although the effects on the wood and water supply are strongly felt in the agricultural valleys.

Forest and chaparral cover. The prevailing cover on the mountains and foothills of the entire region is chaparral. Timber of commercial value exists only in limited quantities. The only large sawmill operates in the Angeles Forest. Small temporary mills are found in the San Jacinto Mountains, Cuyamaca and Coast ranges. In the Angeles and Cleveland forests the estimated area of chaparral is 70 per cent. This figure is fairly representative of the entire southern region, exclusive of the agricultural valleys.

Chaparral. Chaparral is a term borrowed from the Mexicans and applied generically to all dense brush growth found in California. It is also the specific common name of certain species of brush, but in this report is used in its broadest sense.

The representative chaparral cover of the mountains and foothills varies with the elevation and aspect. On the lower slopes *Adenostoma fasciculatum* prevails, usually associated with several species of *Artemisia* and *Eriogonum*. In the canyons *Prunus ilicifolia*, *Ceanothus*

cuneatus, and two species of *Rhus* appear. In the middle elevations *Adenostoma* fades out, save on hot south slopes, and is replaced by *Umbellularia californica, Prunus ilicifolia, Cercocarpus parvifolius,* and various species of *Ceanothus, Rhus, Quercus, Arctostaphylos, Rhamnus,* and by other less common shrubs. On the higher slopes certain species of most of the genera common to the middle elevations persist in association with *Castanopsis chrysophylla, Fremontidendron californica, Garrya fluvescens,* and other species.

The higher south slopes usually retain a chaparral type characteristic of the lower elevations, and differing entirely from the cover on northern exposures at the same elevations. For example, *Adenostoma fasciculatum* runs up warm south slopes to an elevation equal to that reached by *Rhus* and certain species of *Ceanothus* on cooler slopes, and on such situations the species common to north slopes at this altitude do not appear.

Much diversity of opinion exists as to the comparative value of a forest and chaparral watershed cover. Conclusive figures on the comparative run-off from forested and chaparral covered drainage basins are not available, but observation and theory clearly demonstrate the superior qualities of the forest. It is quite as apparent, however, that chaparral exerts a marked water conserving influence, particularly on surface run-off, as shown by the flood discharge and lessened summer flow from streams heading in recently burned chaparral drainage basins. The forest, on the other hand, produces better conditions of soil and humus, is more effective in preventing evaporation, and the roots open up channels in the rocks and soil through which water is diverted to underground channels, to appear later as seepage or artesian water.

The conclusion necessarily is that a forest cover should be maintained, wherever possible, on important drainage basins, particularly on main ridges and near the headwaters of streams. A narrow fringe of trees along streams is also undoubtedly beneficial in reducing evaporation and preventing erosion, and should be secured by planting or protection where possible.

Chaparral, however, is the only cover which can be grown on many situations, and it should be protected and its density increased except where it interferes with reproduction or planting.

The chaparral of lower elevations and south slopes is usually open, and composed of the less valuable species. At middle elevations it becomes more dense and continues to form a good ground cover nearly up to timber line. In general, the chaparral cover of north slopes is much denser than on southern exposures. Of the common species *Adenostoma fasciculatum* is the least valuable as a cover, and *Quercus dumosa,* and several species of *Arctostaphylos* the most effective. Individual bunches of *Rhus laurina* and *Rhus ovata* form excellent cover,

but usually grow too scattered to be of high value. The mountain lilac (*Ceanothus*) occupies an intermediate position, and in some situations, especially when occurring in mixture with *Arctostaphylos* and *Quercus dumosa* is of high value. On the upper slopes *Castanopsis, Ceanothus sorediatus, C. crassifolius,* and *Quercus chrysolepis* form a very dense cover.

Forest. The largest continuous area of commercial timber is found along the crest of the San Bernardino range in the vicinity of Fredalba. The common species are *Pinus ponderosa, Pinus jeffreyi, Pinus lambertiana, Abies concolor,* and *Libocedrus decurrens.* The same species are found in considerable quantities in the San Jacinto Mountains, and on Mount Pinos and Pine Ridge in the Santa Barbara National Forest. *Pinus ponderosa* is also found in commercial quantities in scattered groups through the Cuyamaca Mountains and coast ranges. In western Monterey County redwood occurs in some of the protected canyons along the coast. Other coniferous species of the region are *Pinus coulteri, Pinus attenuata, Pinus torreyana, Pinus sabiniana, Pinus radiata, Pinus murrayana, Pinus flexillis, Pinus monophylla, Abies venusta,* and *Pseudotsuga macrocarpa,* the latter being confined to north slopes and canyons in the mountains south of the thirty-fifth parallel.

The hardwoods of the mountains are mainly oaks, which rarely cover extensive areas, although cool slopes are often occupied almost exclusively by them. The other common hardwoods are the sycamore and alders found along streams.

Fire history. The early fire history of the region is very obscure, yet there is every evidence that fires have long been frequent and severe. The conclusive proof furnished by the fire marks on practically all of the older trees and the present condition of the mountain cover is backed by the statements of the oldest residents who can not recall the time when fires were not prevalent.

The causes were several. The Indians systematically fired the country to keep the woods open, and the early Spanish herdsmen burned the brush to facilitate travel and open up the country. The worst fires, however, followed the advent of the whites. Prospectors set the brush on fire to make traveling easier and expose the rocks; hunters drove out wounded game by means of fire; early settlers started many fires by carelessness in burning brush; while worst of all were the sheepmen, who burned to open up the way for their herds, and to get fresh grass and tender sprouts in the spring. Lightning also must have occasioned fires.

The many effects of the repeated fires through the long period preceding and following the settlement of the southern part of the State are impossible to ascertain. Judging, however, from present influences there must have been a gradual reduction of the forested area, a change

in the composition and density of the chaparral, and the reversion to chaparral of many areas once forest covered. Erosion was also undoubtedly hastened, and the flow of streams influenced as now. The present topography of many of the mountains indicates extreme erosive action, but whether this preceded or followed the formation of a forest cover is impossible to say. It is practically certain, however, that the shallow soil and scanty cover on many drainage basins to-day resulted directly from early fires which prevented the extension of the forest, and permitted the soil to wash away to bedrock. Likewise many slopes once forested are barren now, or retain only an occasional veteran from the original stand.

Since the Indians and Spaniards must have burned the country as often as it would burn freely, it is apparent that fires were then more prevalent than now. There later followed a period when indifference prevailed and fires were ignored, save when mills or other property were threatened. To-day most of the old causes of fire are inoperative, and with the keen realization that forest cover and water are valuable assets and closely related, has come a general sentiment throughout southern California opposing fires. Practically all fires started now are accidental, save a very few set maliciously.

The prevailing fires of the present time, with few exceptions, are caused by human agencies, and in most cases are accidental. Lightning is practically the only natural cause, but the danger from this source is not great. Out of sixty-three fires reported from the San Bernardino National Forest in 1902-1903, only three were known to have been set by lightning. During the year 1909, 638 fires were reported to the State Forester by the voluntary firewardens from all parts of the State. Of this number 79, or 12.2 per cent, were supposed to have started from lightning, while a much smaller number were really known to have been ignited by this cause. The San Jacinto Mountains are said to suffer severely from electric storms, but it is doubtful whether many fires originate directly from them. There is little truth in the somewhat popular idea that many fires are started by broken bottles which act as "burning glasses," by stones rolling down the mountains and striking fire, by spontaneous combustion, and similar causes. In most cases those who look for natural causes for every fire would come nearer the truth by looking after their own and their neighbor's camp-fires and cigar stubs.

By far the majority of fires result from the carelessness or indifference of individuals. The more common causes are camp-fires, brush burning, unextinguished matches and cigarettes, donkey engines and logging machinery. Several fires have also been known to start from burning fuses blown into the brush while splitting wood with powder, from grass fires set to destroy grasshoppers, and from gun wads. Occasional fires

are started from power wires carrying high pressure currents breaking and falling in the brush.

From the data gathered in 1909 regarding forest fires the following interesting table showing the causes of fires within the State as a whole has been compiled:

TABLE III. CAUSES OF FOREST FIRES.

Unknown	Campers	Lightning	Engines	Clearing land	Incendiary	Hunters	Blasting	Smoking bees	Electric wires
250	119	79	64	45	39	24	9	7	2

Despite all advice and precaution camp-fires are everywhere the most potent source of danger. The careless or indifferent camper builds a much larger fire than is needed, and often against a tree or old log where it is almost sure to spread. When such fires are abandoned, the adjacent brush or forest is very likely to burn. Even the careful camper is often responsible, for he contents himself with pouring a little water on his fire, or in letting it burn down, without raking the embers apart and drenching them with water, or covering them thoroughly with fresh earth. A pile of smoldering embers looks perfectly harmless in the calm of early morning, but they may be fanned into a dangerous blaze by the wind, which almost invariably springs up and blows strongly up the canyons during the heat of the day. The resulting fire, whether it burns over one or a thousand acres, can frequently be traced back to the old camp-fire, but by this time the culprit is far out of reach. The only safe plan is to build the camp-fire on rock or mineral soil some distance from any inflammable material, or make a little stone arch in which to confine the fire. Upon leaving, every trace of fire should be extinguished or covered carefully with earth.

Another cause of fire that is much less operative now than formerly is that of brush burning in clearing land. This may result from not piling the brush, from burning during a high wind, or from leaving the fire unguarded.

Much of the oak cut for fuel in the foothills is difficult to split and powder is used in blowing the blocks apart. Fires sometimes originate from a burning fuse blown into the brush in this way.

Prior to the use of crude oil as locomotive fuel many fires were set along the steep grades in Soledad Pass and Cajon Canyon. Small fires are still started by locomotives, but the section men and rangers have prevented their assuming large proportions.

During the long dry season from May until November the brush and

herbaceous ground cover becomes as dry as tinder. This naturally increases the fire danger and makes a spark dangerous from whatever source it may come. Along the roads and trails smokers often start fires by throwing burning matches or unextinguished cigarettes or cigars into the grass or brush. If not promptly extinguished these fires may get beyond control and cause widespread damage.

Excepting lightning, practically all fires are caused by direct human agencies, but the protective measures applied and the propaganda against fires have created an anti-fire sentiment. Many people, of course, remain careless, and ignorance or accident gives rise to many fires, but with a general sentiment favoring protection of the mountain cover, the number of fires which get beyond control is growing less. With millions of acres a veritable tinder box, the situation will remain difficult, but the fire danger in the main is controllable under proper management. Convictions and heavy fines or preferably imprisonment for those who remain careless, and a systematic educational campaign, backed by field methods of fire prevention and control will eventually reduce the danger to the minimum.

Character of fires. The character of the mountain fires depends mainly upon whether they occur in forest or chaparral. Topography and season are secondary influences. Chaparral fires are by far the most dangerous and the hardest to combat. When driven before a high wind they sweep up the slopes with a rapidity and fierceness which makes all attempts to check their progress practically futile. The flames, save on the summits of sharp ridges, will jump any ordinary obstruction, and sparks are often carried for several hundred yards, starting new fires wherever they strike. Fire fighting is made more difficult by the dense brush which prevents getting in front of the flames to back fire, and makes escape almost impossible if a change in wind drives the fire toward the men fighting it.

In dense brush during the dry season, a chaparral fire runs both on the ground and through the tops of the brush, making what would correspond to a "crown fire" in timber. In early spring before the ground is dry and while the leaves are fresh and green, a simple slow moving ground fire may occur, which runs up into the tops of only the species with oily or resinous foliage.

Ground fires are the prevailing type in mature timber, crown fires being practically unknown in southern California. They consume as fuel the litter of needles and twigs, and whatever undergrowth, either brush or reproduction, that may cover the forest floor. The amount of such fuel and the strength of the wind determine the severity of the fire. Ordinarily they are not difficult to control, but if not checked will run through the needles and decayed litter for miles, although seldom becoming severe enough to kill large trees. The exception is found where



The Value of Fire Lines.

The fire line along the top of this ridge stopped a dangerous brush fire. The denuded area on the left of the line affords no watershed protection and is sure to become badly eroded. This is a typical slope in the southern part of the State, where a permanent water supply is essential.

there is a dense stand of brush underneath the timber, or a clump of trees occurs in a chaparral area. Trees in canyons are severely burned at times, since much débris lodges on the upper sides of the trees and burns fiercely. The destructive element of the ground fire is that it kills all reproduction, leaving only a stand of matured trees.

Topography exerts a marked influence, particularly on chaparral fires, where the slopes are steep and the ridges sharp, as in the Sierra Madre Range. A fire is usually checked or dies out on the summit of the ridges. No matter how rapidly it advances up a slope, it subsides at the summit and works slowly down the opposite side, until the wind catches it again at the bottom of the next slope. Burning twigs and sticks roll down the lee slopes and help the progress of the fire, and blowing sparks set many new fires which serve to further its progress. Many cases were seen, however, where fires died entirely of their own accord on the crest of ridges, the line between burned and unburned chaparral being very sharply marked in accordance with the contour of the ridge. In "saddles" the effect of the ridge crest is lost and through them many fires pass from one canyon slope to another. Herein is revealed the need of fire lines on all ridges, so that a fire may be prevented from burning from one canyon into another. In parts of the San Bernardino Mountains the severest fires for years past seem to have been confined to south slopes, the timber running up from the north slopes to the crest of the ridges where it adjoins the frequently burned chaparral of the south slopes. Such fire lines have recently been built by the United States Forest Service in coöperation with the State.

Topography seems to exert less influence on timber fires, although as a rule the trees on "flats" are less severely burned than on slopes and in pockets. The fact that trees are mainly absent from steep slopes, save in protected situations, may indicate that topography had a strong influence in saving the present limited stands from prehistoric fires.

Wind and rainfall are the main climatic influences affecting fires. There is naturally little danger during the rainy season, and extreme danger during the remainder of the year. The occasional showers during the early summer or fall have little influence, since the moisture is quickly evaporated. During the fire season the prevailing wind currents are up the canyons by day and down by night, with a period of calm in early morning. This means that fires may be expected to run up the slopes during the day, but that the wind will check their progress during the night. An uncontrollable day fire may thus be extinguished in the night or early morning. Experienced fire fighters assert that a very strong wind may in itself check a fire since it will blow out on ridges, and cause a helpful back current in many places.

These rather uniform wind conditions are changed for a period in the fall along the Sierra Madres. This is during the time when the so-called

"northers" sweep southward across the mountains from the Mohave desert. The wind is hot and dry and blows continually in the same direction, producing the most dangerous possible conditions in case of fire.

Effects of fire on timber. The cumulative effect of fire on timber is to reduce the forested areas, change the composition, injure the individual trees, and replace forest stands with brush.

The relation of early fires to the present limited forest is impossible to ascertain. It is reasonably certain, however, that the original stand was once more extensive than now. The transformation was undoubtedly gradual, and the same influences may be observed to-day.

Every fire kills a few mature trees, particularly on the margin of a stand adjacent to chaparral, and occasionally a whole group is killed if surrounded by brush. The chaparral immediately takes possession when the timber is killed; subsequent fires kill all reproduction, a few additional seed trees, and also the new chaparral. The brush, however, through its sprouting capacity retains possession, and thus the process of gradually reducing the forested areas goes on.

One of the best examples of the gradual ascendency of chaparral is seen in the San Jacinto Mountains, near Idyllwild. Here are clumps of bigcone spruce and Coulter pine killed by the fire of 1897, with a new growth of chaparral coming in to take their place. In little hollows or ravines on some of the dry slopes groups of short burned tree stubs with chaparral thick underneath remain as the last evidence of a stand destroyed by a still earlier fire. In a few years these stubs will burn or decay, and with their disappearance fire will have completed the cycle and chaparral will have replaced the trees. If more evidence is needed of the existence of a former forest cover, a careful examination underneath the chaparral on some of the lower slopes will reveal charred pieces of logs and the remains of good-sized stumps. The chaparral, in turn, must compete against fire, but its sprouting capacity and early maturity enables it to endure where trees could not survive.

In the remaining timber the most resistant trees naturally endure the longest, and those with the strongest tendency to reproduction eventually replace the weaker species. Thus sugar pine is one of the first species to disappear, while incense cedar and yellow pine on the upper slopes or knobcone pine at lower elevations hold on until the end. Bigcone spruce still predominates in many of the canyons, since it thrives in these cooler, rocky situations. It is not, however, prolific of seed as are the yellow and knobcone pine and incense cedar. The knobcone pine is peculiar in that the cones remain closed for years, and do not open until a fire runs through and destroys most of the original stand. It is, moreover, adapted to the driest, hottest situations where there is sufficient soil.

Individually the trees suffer in varied measure. Save with the exceptions mentioned, mature trees are rarely killed by a single fire. The bark usually resists the first few fires, but once the wood is exposed, each fire burns a little deeper into the trunk, reducing its value for lumber, and making the tree liable to overthrow by wind. Scarcely a tree can be found which is not charred or deeply scarred. The bigcone spruce is the most liable to burn through, most of the other species living for years even with a hole entirely through the trunk. The incense cedar in particular will live on with only a few inches of live bark and cambium remaining at the base. White fir bark is the most fire resistant, but as an antithesis the wood is very inflammable when dead and dry, and decays rapidly where the bark is burned off.

On chaparral. Ordinarily, chaparral suffers only a temporary setback when burned. The effects of repeated fires are changes in composition, and a reduction in density on hot southern slopes where the soil is shallow.

It is only the severest fires that burn the chaparral to the ground, and even then a large percentage sprouts freely. Usually only the leaves and small twigs are burned off, the dead wood furnishing additional fuel for the next fire. The greasewood (*Adenostoma fasciculatum*), however, has little sap, the leaves are oily, and frequently only short stubs remain, while the scrub oak and associate species are merely killed, but not consumed. Exceptions to the above, however, are not infrequent. The Fredalba fire of December, 1903, for instance, extended down into the dense chaparral at the head of Plunge Creek, burning it off to the ground in most cases.

Changes in composition are brought about through the varying fire-resisting and sprouting powers of the species. *Quercus dumosa* and *Adenostoma fasciculatum* are perhaps the most resistant species, the former especially never losing its sprouting capacity even after the most severe fire, and the latter rarely. Most species of *Arctostaphylos* are also tenacious of life. On the other hand, a certain per cent of the *Ceanothi* fail to sprout after a fire. Given then a fire in a mixture combining *Quercus dumosa, Adenestoma fasciculatum, Ceanothus crassifolius*, and *Ceanothus cuneatus*, and we have an example of the resulting changes in composition. The first two will sprout promptly, while part of the last two will be killed entirely, and the remainder sprout slowly. The result is that the more resistant species become predominant, while the other after repeated fires are killed out.

These points have a practical bearing where species valuable as a watershed cover are replaced by undesirable species. For example, *Adenostoma fasciculatum, Ceanothus cuneatus,* and *Rhus ovata* are a mixture frequently found on low and middle elevations, and together they form a good ground cover. In several actual cases the *Ceanothus*

and *Rhus* were seen to be practically killed after a fire, the undesirable greasewood replacing them. These cases could be multiplied indefinitely. There seems to be very few seedlings of chaparral species replacing those killed.

The density is reduced through this same failure of certain species to sprout, and because the shallow soil on steep south slopes washes away before the cover is replaced. On the cool north slopes, where the fires are not especially severe, the chaparral recovers fully. On south slopes the completeness of recovery varies greatly and is usually slow. In places there is a gradual return to the original density; again, as high as 60 per cent of the original cover is lost; while occasionally over rock there is no sprouting and no possibility of a new cover of any kind. A striking example of a reduction in density is found along the trail from Hines Peak to Ten Sycamore Flat in the Santa Barbara National Forest, where much of the *Ceanothus sorediatus* and *C. crassifolius* succumbed to a fire of ten years ago, while only the scattered *Quercus dumosa* has sprouted freely. Burns in chaparral often seem to be recovering fully, when in reality the injury is serious and permanent. This results from the rank growth of herbaceous plants, such as *Eriogonum* and *Artemisia,* which spring up, particularly on lower slopes occupied by greasewood. Such growth looks satisfactory from a distance, but is worthless as a cover and dangerous in case of fire.

On drainage basins and stream flow. The fundamental effect of fire in the cover of a drainage basin is to cause a more rapid run-off during the rainy season, followed by a reduced summer flow. The gradual reversion of forest to chaparral has no doubt entirely changed the character of the flow in all streams, but comparison of original conditions with those of the present is obviously impossible. Many changes of comparatively recent occurrence can, however, be cited.

Sespe Creek in the Santa Barbara National Forest, in the memory of men not past middle age, was a good sized stream all summer, with no sudden rise during the winter rains. Now it goes dry above Hot Springs Canyon in the summer, and in winter rises and falls rapidly with every rain. The cause is easily traceable to the extensive fires set by sheepmen during the two decades prior to the creation of the national forest.

The burn of October, 1903, on the Gridley Creek watershed, which flows into the Ojai valley from the same forest, has had a marked effect on the flow of the stream. Every heavy rain since has raised the stream to a torrent within an hour, and within twenty-four hours the flow becomes normal again. Formerly the stream came up slowly and gave a sustained high flow for five days.

The streams flowing south from the Santa Ynez Range across the narrow coastal plain near Santa Barbara were formerly full to the sea

the year around. The south face of the range has burned over several times since, with the result that those streams are now dry save during periods of unusually heavy rain.

A big fire estimated to have burned over 10,000 acres occurred in the Big Tejunga and Arroyo Seco watershed of the San Gabriel Mountains in 1896. The next spring extensive floods came down the Arroyo Seco carrying silt, and large quantities of ash and charred wood.

In 1884 occurred a series of disastrous floods in the Los Angeles Valley, which gullied and ruined much agricultural land. In Soledad Canyon the tracks and bridges of the Southern Pacific railroad were swept away, delaying traffic for nearly two months. These floods are said to have resulted from extensive fires set by herdsmen.

Also in the early eighties a big fire swept over practically the whole west side of the Santa Ana range. Its results were felt for years in the reduced and irregular flow of streams finding source in these mountains. One particularly heavy flood followed soon after the fire, and gullied or washed away several hundred acres of fine agricultural land in Capistrano Valley.

Further cases do not need to be cited to show the need of protecting the drainage basins of southern California from fire. The water supply is insufficient at best and any steps to protect or restore the cover on important catchment basins will be of the highest public benefit.

The destruction of a forest or chaparral cover by fire has a distinctly injurious effect on the drainage basin itself, by exposing the soil to leaching and erosion. The heavy winter rains rapidly gully the steep slopes, and where the soil is shallow often expose the bedrock and prevent future growth of any kind. A secondary effect is the silting of canals and reservoirs by streams flowing from recently burned basins.

Definite data are not available on the influence of watershed denudation on the underground water of adjacent valley land. It is reasonable to assume, however, that the destruction of the water conserving cover of the mountains must reduce the amount which finds its way to underground channels. The rapid run-off from burned slopes gives no opportunity for water to percolate down through the rock fissures to the gravel beds of the valleys, and the amount thus lost through flood run-off must be great.

Relation of fires to local water and timber supply. The water finding source in the coast ranges, particularly in the southern portions, is not impounded in reservoirs, or diverted to any extent through ditches from perennial streams. It either flows west into the Pacific and is lost or sinks into gravel beds or runs to waste in the valleys on the eastern side. The mountains support only a limited population, and the main income, aside from tourists and campers, is from stock raising. In the adjacent valley sugar beets and potatoes are the main crops. Water may

eventually be in greater demand, although in normal seasons the rainfall is sufficient to mature the crops. The limited timber supply is used locally, but should be protected for this purpose alone. Since water and wood are not of high local value, fire protection is not a question of deep concern to the natives. From San Luis Obispo southward the value of water is appreciated and local sentiment favors protection. The whole coast region is a promising field for forest planting, if adequate protection is provided.

In practically the whole region south of the Tehachapis there is a much closer relation between the fire question and the water and timber supply. Water is indispensable to the development of the region, and the cities as well as the agricultural sections are entirely dependent on the water finding source in the adjacent mountains. Practically all available water is at present utilized and future developments will be limited to the increased supply secured from local or far distant sources. The protection of the mountain cover from fire will improve the chaparral and forest conditions, and at least insure the perpetuation of the present streams. Every acre reforested should increase by just so much the available supply, and bring additional valley land under irrigation. On the other hand, repeated fires will so injure the drainage basins that the supply will be lessened, and orchards now highly productive will have to be abandoned.

The present limited supply of water is sufficient to irrigate only one acre out of every $6\frac{1}{2}$, the remaining $5\frac{1}{2}$ acres, or about 84 per cent of the total irrigable area being practically desert. This land with water is worth as high as $2,000 or even $3,000 per acre; without water 50 cents would be a good price unless there was immediate prospect of securing water. The average rental value of water for citrus crops is about $10 per acre, while the capitalized value of a miner's inch is about $2,000. The producing power of this amount, however, is much higher. A miner's inch under ordinary conditions will irrigate a five-acre orange grove. This grove should produce 1,650 boxes of fruit annually, worth $2.50 a box on the Eastern markets, or a total value of $4,125. Thus every miner's inch of water should put about $4,000 into circulation annually.

The main advantage gained by protecting and increasing the local timber supply will be the saving of freight rates from distant points. Southern California imports most of its timber, and can hope to produce only a very limited supply. It is important, however, that the existing timber and young growth be saved from destruction by fire, and the producing power of the forest land retained. Fuel wood at least can be grown in quantity locally.

The necessity for fire protection is very obvious in relation to both the water and timber supply of southern California. In the future as

the demands increase and the supply becomes more inadequate, this fact will be brought home with greater force.

In a nutshell, fire protection will better the condition of the mountain cover, and conserve and increase the water supply while improving the drainage basins as a whole; and opportunity will be given for the natural and artificial extension of forest growth.

Public Sentiment.

There is probably no section of the United States where public sentiment is stronger toward forest protection than in southern California. This is particularly true of water users, yet it is general among nearly all classes. The relation of the mountain cover to various industries of the valleys is thoroughly appreciated, and all steps toward its improvement are warmly welcomed. Commercial organizations and influential citizens have been very active in encouraging fire protection and forest planting.

It is unfortunately true that in some cases the impossible is expected. The great cry is for more and cheaper water with which to develop more land. Fire protection will certainly improve the conditions, and forest planting on some situations is entirely feasible and will give good results. There are decided limitations, however, to all this work and the results will not be as prompt nor the effects as noticeable as many anticipate.

The conditions described above show clearly that fire protection is a particularly vital matter for southern California. And the very conditions that make the problem so important make it also difficult of solution. Fortunately, the extreme dryness and the rugged nature of the country are offset to some extent by two circumstances, namely, an extremely favorable public sentiment and the fact that most of the country on which fire protection is especially necessary is owned and administered by the Federal Government. But in spite of the fact that the Government employs more than twice the number of rangers per unit of area in southern California than it does in northern California, the force is still inadequate.

Any successful system of forest protection is based upon (1) the early discovery and reporting of fires, and (2) available fire fighters. This means plenty of patrolmen with trails for them to get about on and telephones for reporting. It means also transportation facilities from the places where fire fighters may be hired to the danger points. It means finally money to pay the expenses of fire fighting and the construction of fire breaks, etc. The Government allotments are not sufficient to accomplish all these purposes.

But the people of southern California have come to the front in the most praiseworthy manner, both by securing county appropriations for fire protection and by offering their individual services as voluntary

firewardens. Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego counties all recognize the fire danger and assess themselves to decrease it. The weak point is lack of organization. At present this office, since it does not share expenses, is practically without authority in the matter. The remedy is discussed below.

NORTHERN CALIFORNIA.

Evidences of early fires. The beginning of the period during which forest fires have been prevalent in northern California far antedates authentic history. The first white men found that the Indians burned over the forest floor every fall to drive out game at the time of the annual "drive," and to keep the woods open. This custom has probably prevailed for centuries.

The forest itself gives abundant evidence to corroborate the unwritten records of the early settlers. Scarcely a mature tree can be found which is not more or less charred, and many of the larger trees are badly burned at the base. The best specific fire record shown by an individual tree was on a Jeffrey pine, 3 feet in diameter, south of Lake Tahoe. It had a typical partially healed fire scar at the base, and when cut into 2-foot sections, the fire record, as preserved by the rings of growth which covered the marks of each successive fire, was complete in all its details. It showed that the first fire which burned through the bark into the wood occurred one hundred and forty-seven years ago. The next fire followed twenty-three years later, or one hundred and twenty-four years ago, after which there were no traces of fires for fifty-one years, or until seventy-three years ago, when the last fire to burn into the wood occurred.

In Butte County a Douglas fir stump contained a well defined fire scar, with the charred wood still intact, which was covered by 227 annual rings of growth. On many other trees holes which were burned into the wood a century or more ago were frequently found. These proofs alone are sufficient to show that forest fires were prevalent in California long before the earliest settlers came.

Effect of early fires. The forests of northern California would be more valuable and more extensive to-day if fire had not run through them for so many years. Individual trees have been killed, the density lessened, natural extension checked, chaparral areas increased, and watershed cover injured. In most of the forests of the northeastern United States the fire damage followed lumbering, and the original timber was the result of competing productive forces. In California, where climate and soil favored optimum growth, the destructive element of fire was continually present. The forests, despite this factor, are almost unsur-

passed, but they would have undoubtedly been much finer had the fire element been absent.

Causes of fire. As has been stated, most of the early fires were set intentionally by Indians. Following the Indians came the Spanish herdsmen, who deliberately fired the country whenever it seemed to their advantage. During the early industrial development of the region the most common cause of fire was the sheepmen. They were a nomadic class, mostly Portuguese or "Basks" who owned no land and rarely even a home site. They wandered through the mountains with their bands of sheep, firing the brush or forest behind them. Hunters and prospectors, as farther south, were also responsible for many fires.

Conditions have changed greatly in the past fifteen years, and at the present time careless campers, and logging locomotives, and donkey engines start most of the fires. The Indian danger is past, save in San Joaquin County, where drunken Mono and half-breed Indians often unintentionally start destructive fires. Less common causes of fire are brush burning, wood blasting, carelessness with matches, etc., mentioned under the heading of Southern California.

A comparatively new source of danger comes from the development of the lumber industry. This brings an additional number of men into the mountains, and the accumulation of débris after logging adds greatly to the fire danger. Logging locomotives and donkey engines, since they burn wood, very frequently throw sparks into the inflammable brush and litter. Since oil is used exclusively for fuel by the through lines traversing the forest regions the danger from sparks is minimized. On the heavy grades, however, the adjacent brush is occasionally ignited.

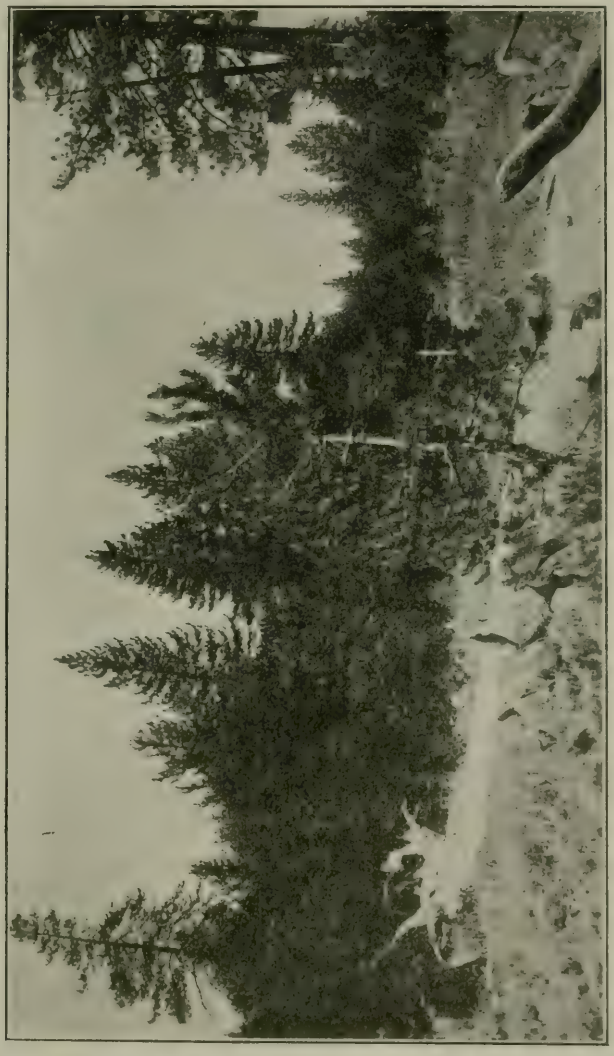
Lightning occupies a secondary place in the list of fire causes. Dead stubs are sometimes set on fire, and the flames may spread. The worst feature is that such fires start in isolated, unexpected places.

Most of the fires are preventable, and as the State and Federal administration on forest lands becomes more intensive and educational measures more effective, the reduction of the fire causes should follow. The more intelligent who use the forests will voluntarily exercise all possible care. The indifferent or careless must be made to obey the laws. Eternal viligance on the part of all forest officers will be the means of fire control.

Timber fires. In virgin timber ground fires are the rule, but occasionally the flames reach up into the foliage of large trees, where the stands are dense. Where there is little undergrowth ground fires are easily controlled, but they often burn deep into the humus, and sometimes smolder for days. Wherever dense undergrowth exists, as along the lower edge of the timber belt, the fires are naturally more severe and more difficult to control, and individual trees and clumps are killed.

The erratic behavior of a ground fire in the unlumbered forest is very

noticeable. In one spot it may burn with severity enough to kill or injure good sized trees; again, for long distances it will run so lightly over the forest floor as to little more than black it, destroying, however, practically all of the young reproduction, while here and there it will run out in irregular tongues with large unburned areas between.



Encroachment of Lodgepole pine.

The original stand was Jeffery pine, but fire running through the slash killed the few remaining seed trees, resulting in a nearly worthless stand of lodgepole pine. Had the area been protected, a valuable second growth of Jeffery pine would have been assured.

On cut-over land the fires assume an entirely different character. Three conditions are created, each favorable to fire: (1) The accumulations of unburned, undecayed slash and débris; (2) the brush which has replaced the timber on the older cut-over acres; (3) the dense thickets of coniferous reproductions which have escaped destruction.

Many factors, such as season of the year, wind, condition of the slash, and topography, influence the character of fires on cut-over land. As a rule, however, they are very severe, and destroy all reproduction and eventually, if repeated, all seed trees. Where brush has taken possession, as is often the case, the chaparral fires are brought up into the timber belt, and as a consequence great damage is done.

Chaparral fires. In the lower foothills the brush is so open that the fires are not violent, save in individual bushes or clumps of brush. The dry grass, however, carries the flames readily, and a rather fast running fire, severe in places, is the result. In the upper foothills where the brush is dense, and in chaparral generally, a fierce fire, difficult to control, is the rule when wind and weather are favorable.

Influence of topography. Topography exerts less influence in northern than in southern California. The slopes, as a rule, are not so steep and the ridges less sharp. On the other hand, there are more streams and natural breaks than on the chaparral covered southern mountains. The general tendency of a fire to run rapidly uphill holds, but it also moves rapidly down the gradual slopes, if conditions are favorable, and does not die out on the flat ridges.

Influence of climate. The wind currents are very erratic and can be little depended upon in fighting fire. Of course, if a strong, steady wind is blowing it carries the fire with it, but there is less certainty as to its duration and direction than farther south. Ordinarily, however, a fire slackens at night and is then easiest to control. The duration of the rainy reason determines the length of the fire season. The period of danger begins in early spring after the rains have ceased, and before vegetation starts, and reaches its maximum during the rainless summer months.

The following table compiled from the fire data of 1909 for the State as a whole shows in a clearly defined manner the distribution of fires throughout the year according to months:

TABLE II. SEASONABLE DISTRIBUTION OF FIRE BY MONTHS, FOR 1909.

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	1	1	6	31	66	145	174	168	37	8	1

Effect of fires on timber. The ordinary ground fire seldom kills mature trees, unless they are surrounded by dense brush or slash, and the damage, from a lumberman's view-point, is not great. There is, however, an appreciable financial loss from the burning out of the base of the trunks by repeated fires; while the destruction of young growth and the reversion of forest land to chaparral is clearly a public calamity.

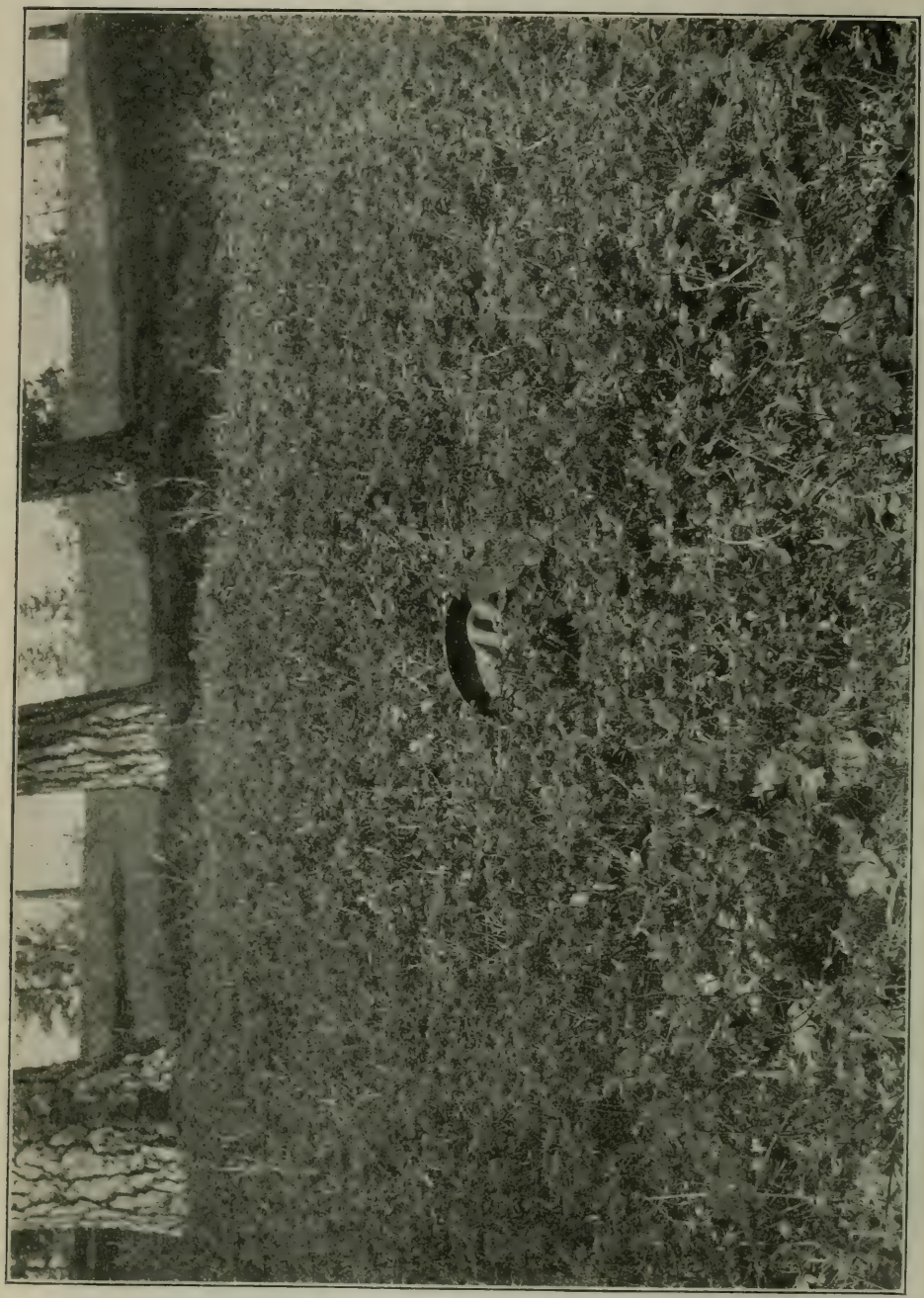
Practically every mature tree shows marks of fire either by the charred bark or burned out base. Many of the largest sugar and yellow pine have cavities at the base large enough to shelter a man, and every fire burns in a little deeper. Some of these trees eventually burn through or are blown down, thus reducing the density of the forest; while the repeated destruction of young growth prevents a return to normal density.

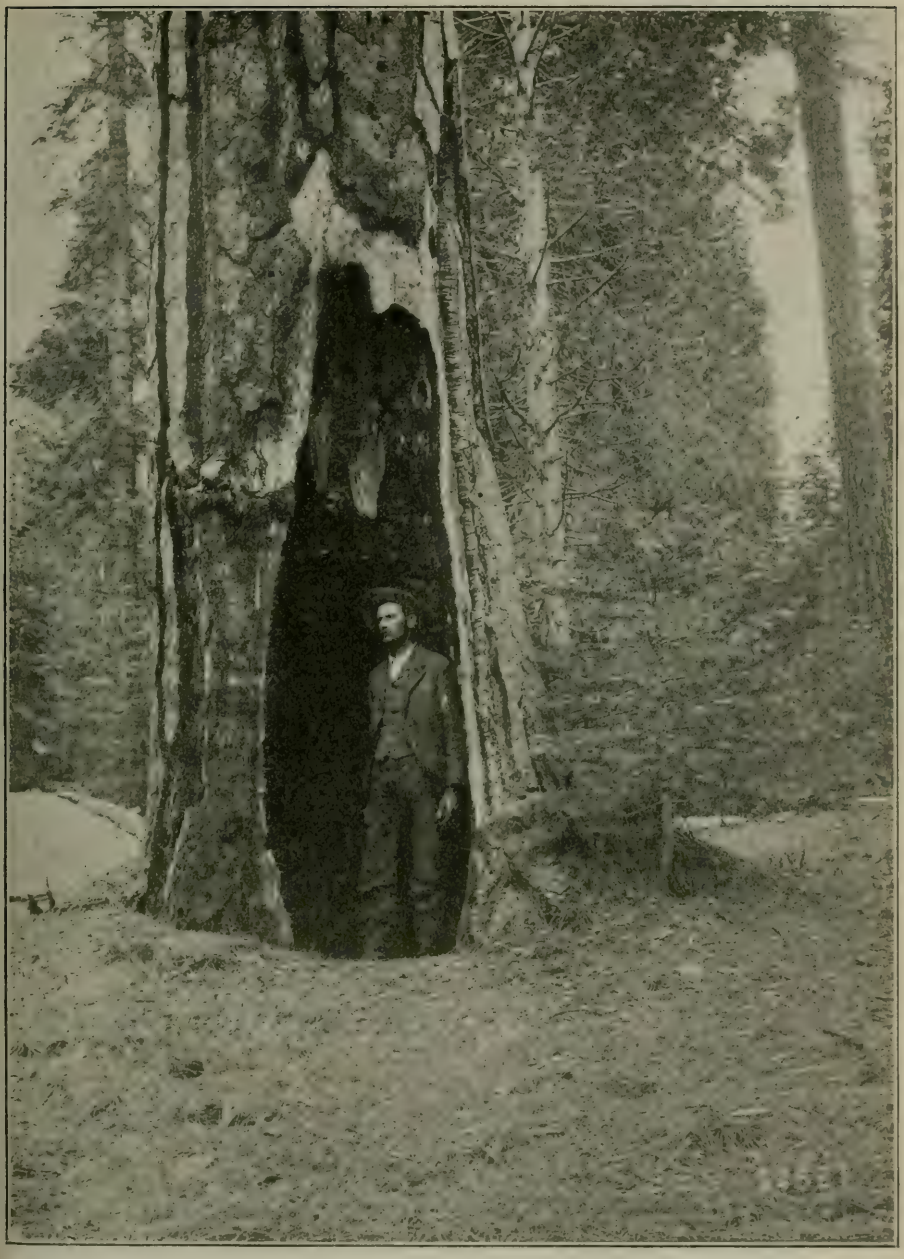
Figures secured in a logging camp in Tehama County show that the "long butting" necessitated by the burned out cavities in the butt logs amounts to 4.50 per cent of the total cut. This does not include the waste in high stumps where the cut is made above the cavity, nor allow for the inferior lumber near the burns, where the heat has hardened the pitch. In the aggregate the loss would often be 10 per cent; taking, however, the very conservative figure of 5 per cent, and the loss to a concern cutting 30,000,000 board feet a year amounts to 1,500,000 feet B. M. If valued at $20 per thousand this means an annual loss of $30,000. Despite this, ground fires are said to work little or no damage to large trees.

It is difficult to say what species of pine suffers most, as the damage varies with localities. The Douglas fir (*Pseudotsuga taxifolia*) is slightly more resistant to fire than pine, and burns grow over more rapidly if not too large. The fir suffers most, as the foliage is very inflammable, and the wood when exposed by fire decays rapidly. The big trees (*Sequoia washingtoniana*), although badly scarred, have rarely been killed or had their vitality greatly reduced by fire. Their bark burns very reluctantly, but despite this repeated fires have burned large cavities into the base of most of the large trees.

The reversion of timber land to chaparral through repeated fires which kill the reproduction and eventually the seed trees, is one of the serious problems in the commercial forests. The chaparral is able to endure these repeated fires since it sprouts from the root, and has obtained possession of enormous areas once densely forested. One of the best examples is seen around the base of Mount Shasta. The general situation differs from that of southern California in that it is still in the progressive stage, and the forest lands still greatly exceed the chaparral. Along the lower timber belt *Ceanothus cuneatus*, *Prunus subcordata*, *Arctostaphylos glauca*, *Arctostaphylos viscida*, *Quercus wislizenii*, *Cercocarpus parvifolius*, and *Ribes speciosum* are the principal species replacing the forest. At the higher elevations the pernicious *Ceanothus cordulatus* is taking possession where fire or lumbering has removed the forest. *Abies concolor* is about the only species which readily works back into the chaparral when fires are prevented.

On chaparral. The general effects of fire on chaparral are similar to those discussed for southern California. The chaparral persists in spite





Effect of Repeated Fires on Mature Timber.

The butt log of this Jeffery pine contains no merchantable lumber; the tree has been so weakened that it will blow down and add an increased fire danger to young growth. Millions of feet of lumber have been wasted in this way.

of fire and takes possession of open areas rapidly, but is at times reduced in density, and changed in composition by frequent burning.

The common chaparral species are susceptible to fire in varying degrees. In the foothills *Ceanothus cuneatus,* and on the higher elevations *Ceanothus cordulatus,* burn most readily. With both, this is not because the foliage is particularly inflammable, but because they grow in dense stands and contain much dead material, such as twigs, leaves and branches. *Umbellularia californica* burns fiercely on account of the oily nature of its thick leaves. The species which burns most reluctantly is *Aesculus californica,* although all species of *Prunus* are nearly as fire resistant. The several species of *Arctostaphylos, Cercocarpus,* and *Quercus* burn indifferently, not carrying or holding flame, but burning freely where sufficient heat is generated by other fuel.

All the chaparral species sprout readily after fire save *Ceanothus cuneatus,* and some of the larger forms of manzanita.

Relation of Fires to Local Water and Timber Supply.

Water is finding increasing use for irrigation and power. The highly productive portions of the San Joaquin Valley are under ditch and the mountain streams of the adjacent Sierras are being further developed. While the rental value of water is not as high in this valley as south of the Tehachapis, it is, nevertheless, indispensable to agricultural development.

The streams flowing into the Sacramento Valley are by no means fully utilized for irrigation, although several power houses are located on the mountain streams. The future promises enormous agricultural development in this valley, and if the irrigable land is brought under intensive cultivation, the available water will assume high value, and necessity for fire protection of the watersheds more apparent.

On the whole the forest cover, fire, and water supply are closely related, as in the southern region, with the difference that the watersheds have not been so highly developed nor the forest cover so seriously impaired. In the middle Sierras there are several streams which will give a sustained flow despite fire injury to the forest, since they find source in the snow fields above timber line.

Lumber is one of the most important products of northern California. Upon the prevention of fire depends the future timber supply. If the fire situation is controlled, young growth will voluntarily replace the original timber on favorable situations, planting will be feasible where natural growth fails, chaparral areas will be reclaimed, and the water conserving power of drainage basins maintained. If fires are allowed to occur frequently as in the past the above results will be negative, and the existing and potential forest lands will be barren and eroded or covered only with worthless brush.

Public Sentiment.

The inhabitants of the mountains accept new ideas slowly and as a class are not enthusiastic regarding fire protection. The agitation of recent years and the enforcement of national forest regulations has changed their point of view somewhat, but there is still a widespread feeling that fires are inevitable and that protective measures are not worth while. There is also an expressed sentiment that occasional fires to clean up the forest floors are a good thing, and in some quarters a return to the old Indian custom of annual burning is strongly urged. In the foothills the use of fire is advocated to kill the brush and improve the grass. The natives of the mountains need careful watching, and should be made to feel the force of the State and Federal laws.

Lumbermen's Methods.

A lack of method has characterized the lumberman's management of the fire question. When a dangerous fire starts all hands are called out to fight it, and the mills are shut down if it assumes large proportions. Interest then wanes until the next fire starts.

The safe and economical disposal of slash is the most essential question on private timber lands in northern California. Fires that follow the loggers not only destroy the reproduction and seed trees and injure the soil on cut-over land, but often run into and damage adjacent standing timber. Slash is always a menace, and unquestionably it should be burned at a time when the fire can be controlled without excessive expense. This is usually in early spring or late fall, when the ground is moist and the slash is not dry as tinder. It should be piled in places and thrown back from seed trees and promising young growth. With careful preparation and by burning small blocks at a time and choosing a day when the air is calm or the wind favorable, slash burning can be successfully accomplished at a cost which should add but a few cents per thousand to the cost of the lumber manufactured. If slash burning is contemplated, care can be taken in felling so as to bunch the tops and save seed trees and reproduction.

Since many lumbermen are indifferent to fire, or consider slash burning and systematic protection impracticable, it is clearly a duty of the State forest officers to coöperate with private landowners, and inaugurate plans of fire protection on lumber tracts in representative regions. It is also their duty to enforce the State fire laws, and secure a change of sentiment by an educational campaign. For lumbermen have often been regarded by unthinking persons as enemies of the public. Their property is as a rule so situated that it really does make a difference to the public whether it is handled well or ill. And because conditions of markets and transportation have hitherto been such as to almost compel wasteful methods the lumberman has received the name of vandal, and

has often found himself unable to obtain a fair hearing. The noisiest conservationists are apt to be those who know the least about the subject, and the profession and practice of forestry has always suffered most not from its opponents but from its hysterical friends. Such are always likely to advocate mischievous legislation to regulate the private handling of timber land. Reasonable legislation most progressive lumbermen have no objection to, but laws might easily be passed that would put them entirely out of business, and with sentiment so strongly against them as at present dare not openly protest. In order to enable lumbermen and timber owners to protect themselves from misrepresentation it was proposed to them to form an association under the auspices of this office. With more than half the timber of the State in private ownership, the attitude of the lumbermen toward forestry is without question of great importance. This office has endeavored to introduce forestry principles in the lumber woods by degrees with the view of working around later toward more and more conservative methods, but always to show the lumberman that the changes suggested are practical and in his own as well as the public interest. Our object is not to force the lumberman by legislation or otherwise to adopt better methods against his will, but to suggest only those changes as are reasonable and show him that those are a good investment. In consequence, a number of large concerns are now making a practice of burning over in the fall or spring the area cut over the previous summer in order to reduce fire danger and leave the ground in the most favorable condition for reproduction. Thereafter the area is to be protected.

This is only a beginning, but it represents an enormous advance over the methods of previous years, and in itself if generally adopted will prevent cut-over land from falling into the ruinous state which formerly was almost certain to ensue. It has furthermore been accomplished without sacrificing friendly relations between the lumbermen and this office. If lumbermen had been forced to adopt such methods under penalty for refusal little good would have resulted. No doubt the future will show the need of regulating lumbering to some extent by law. There will always remain some shortsighted lumbermen who will be content to log under the old methods even after conditions have changed to such an extent that they are no longer either necessary or profitable. These will wish to skin their land and neglect it after it is once cut over, and in the interest both of the public and of the more progressive lumberman who wishes to adopt conservative methods public opinion will demand that they be legislated against; proper forestry laws, however, are by no means easy to frame; they must be drawn by experts if they are to work well. The lumberman must be consulted, not necessarily because he has an interest in such laws, but because his knowledge of the subject is the most exact obtainable. Yet with public sentiment

the way it is the lumberman is practically barred from participation, especially if his opinion on proposed legislation runs counter to that of the ordinary citizen.

A campaign of education is therefore necessary to show the public (what they least expect) that the foremost practical conservationist is the progressive lumberman, and to organize and systematize this campaign was one of the objects of the proposed association. Other objects were to secure more effective protection from forest fires by coöperation to that end; to get the lumber industry as a whole in closer touch with this office; and to provide an opportunity for lumbermen to discuss with each other affairs relating to their business.

A preliminary meeting was held in October, 1909, in San Francisco, to discuss the question of organizing such an association. All parts of the State sent representatives. The need of an association was shown at once by the great variety of opinions expressed. It was decided, however, that an association should be formed with the title California Forest Protective Association, and a committee was appointed to draw up articles. There was so much delay, however, on the details of organization that the forest fire season came on with no general organization accomplished. One practical result of the meeting was the formation of a small coöperative forest fire association by four redwood companies whose holdings adjoin each other. A further attempt to form a general association will be made this winter.

REDWOOD BELT.

Region Covered and Brief Description.

The region covered under this head is coincident with the belt of commercial redwood along the coast from the Oregon line to southern Mendocino County, and which reappears in Santa Cruz County. The purest and densest stands and the best quality of lumber are found in Del Norte, Humboldt, and Mendocino counties. The redwood in Santa Cruz County is smaller, and mixed to a greater extent with other species, principally *Quercus densiflora.*

Prevalence of Fire.

Although not considered a "fire country," the entire belt occupied by redwood has been burned over repeatedly, and the fire marks on the trees indicate that fires have been prevalent for centuries. The frequency and severity of the fires increase from north to south. The floor of the virgin redwood forests in the northern counties is continually moist, and fire will not run save on the ridges or during exceptionally dry periods. Farther south the stands are so dense there is less moisture, and undergrowth is more plentiful. During the late summer and fall,

when the trade winds are blowing, the débris and undergrowth becomes dry as tinder, and damaging fires frequently occur. On the whole, however, the redwood suffers less from fire than any California tree, save possibly Monterey pine.

Most of the severe fires of the present time follow lumbering. After the trees are felled the slash and general débris is intentionally fired to facilitate logging, and very frequently the cut-over land burns accidentally a second or third time after the logs are removed.

Character of Fires.

In the dense stands on "flats" in the north the moist litter and lack of undergrowth result in light ground fires which do very little damage. On the more open ridges the undergrowth is frequently killed and cavities are burned in the larger redwood trees. In Santa Cruz County the fires are more severe, undergrowth and small trees are killed, and considerable damage is done to large timber.

The slash fires are usually very severe, consuming the débris, burning the sapwood on felled timber, and killing the redwood sprouts and remaining oak and red fir trees.

Cut-over land burns freely, the intensity of the fires depending on the ground cover, season, wind, and time since previous burn.

Use of Fire in Logging.

The redwood country is the only region where slash is intentionally fired. It is almost the universal custom to burn the cut-over areas prior to removing the logs to get rid of the bark and general débris which would interfere with logging. In the northern redwood forests most of the burning is done in the spring or fall. The trees are felled, peeled, trimmed, and sawn into logs, then the whole felling area is set on fire. The logs can then be hauled out easier and the movements of the men and donkey engines facilitated. "Donkeys" with wire rope attachments haul the logs to the main slide, down which they are drawn in "trains" by the "bull donkey."

Effects.

Fire has been used as an adjunct to logging on the assumption that no damage was done the felled timber. The custom is still followed, but of late there has come a realization that it is not a desirable practice. The cleaning up fires destroy most of the sapwood, and often burn deep into cracks, cavities, and soft spots in the heartwood. Sapwood was formerly of no value, but it is now manufactured into shingles. Under present market conditions, lumbermen estimate that there is a loss of perhaps 10 per cent from burning redwood logs, as much of the sapwood is destroyed. The feeling that present methods of logging with the aid of fire result in appreciable loss is very general.

The logging fires and those which follow have other results than mentioned above. The redwood sprouts, and the reproduction of other species are destroyed, the red fir and oaks which were associated with redwood are killed, and the growth of a worthless ground cover encouraged. These losses, however, are seldom considered, save where a second growth of tanbark oak is desired. The redwood will sprout repeatedly when burned, and in Humboldt County particularly it is a source of regret that the sprouts are not more easily killed so as to clear the land for pasturage. As soon as lumbermen begin to hold their cut-over land for a second crop, the damage from repeated fires will be realized.

Changes in Methods.

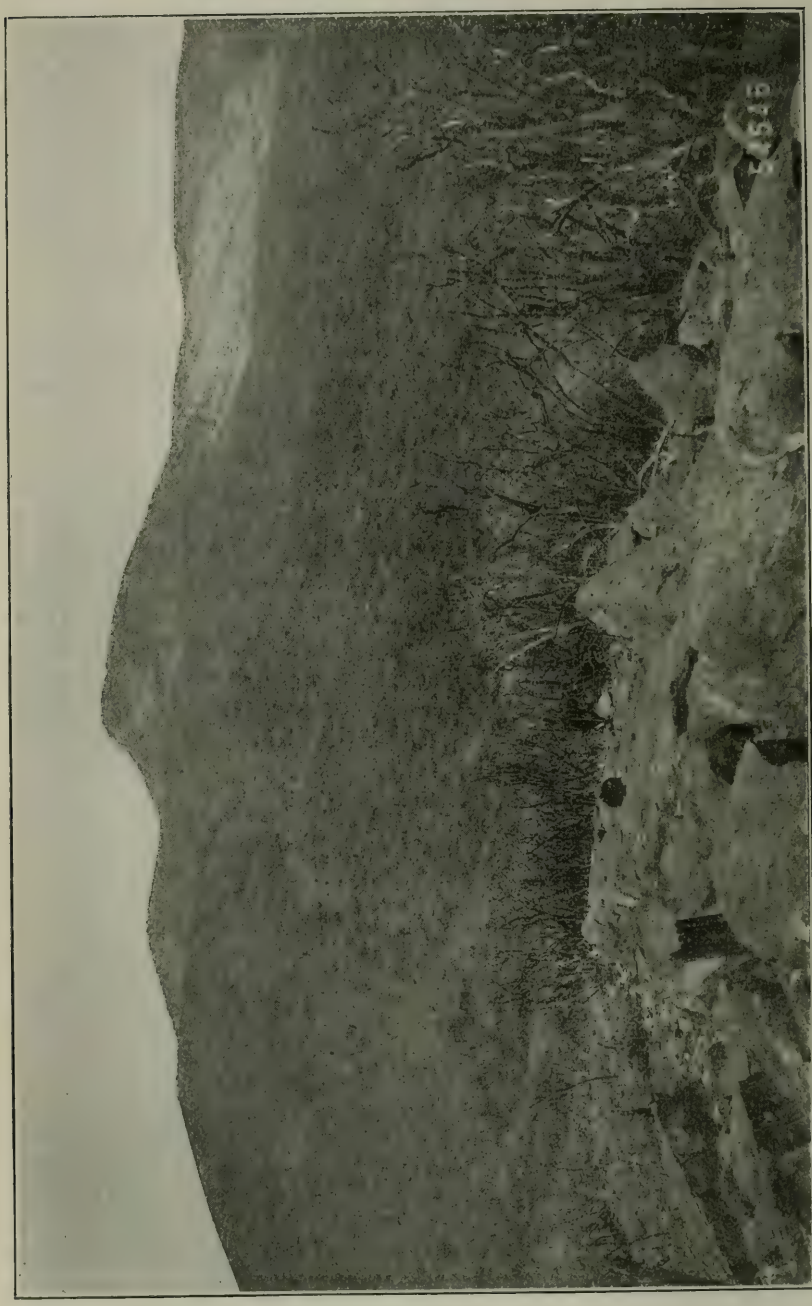
How to log redwood without the use of fire is up for solution. Most of the large redwood concerns are anxious to find a feasible method, and a series of experiments in coöperation with some company would be profitable.

There are two main difficulties in the way: (1) The opposition of the logging bosses to changes in methods, even though desired by their superiors; (2) the increased expense of logging if the débris is not burned. The first is a more serious problem than would be supposed. Good logging bosses are scarce and most of them have become proficient only after years of experience. Their reputation is based on the timber they can deliver to the mills daily, and they object to changes which will increase the cost or reduce the output. The owners, since they must keep their mills supplied, do not care to risk radical action with the logging bosses.

Redwood logging operations invariably produce a large amount of débris. This should be burned as a matter of safety, but after, instead of prior to, the removal of the logs, if possible. The problem is how to get the logs out of this débris, and how to burn it later without excessive expense. Two methods are suggested for trial: (1) Overhead wire rope logging; (2) to log and burn alternately in narrow strips.

The first will probably be impracticable, since the size of the logs would require unusually heavy cables and engines. This plan, however, is favored by certain companies.

The other plan promises to be feasible and should be tried. It is, in brief, to fell a narrow strip along a suitable slideway, and near a spur of the logging railroad, haul out the logs in the usual way, then burn the strip. Another strip would then be felled back of first and the logs hauled out across the strip first logged and burned. The débris left on the second strip would then be burned, and the trees felled on another strip still farther back. In this way fire would not touch the logs, yet the hauling would be done over cleared ground. In some situations



Fire Control.
Chaparral fire stopped by a flat ridge.

fire would not need to be used at all. The above plan would only obviate burning before removing the logs. If a scheme can be devised to do away with fire entirely, so much the better, but this will not be practicable, since redwood bark and slash decay slowly and would remain a veritable fire trap for years.

The control of fire will greatly influence the ultimate disposition of much of the cut-over redwood land. It will undoubtedly pay to hold such land for a second crop, provided the redwood sprouts can be protected from fire. It may also be found advisable to plant other species on some situations. As long as the fire damage remains, however, lumbermen will have little incentive to hold their cut-over land for any purpose.

In Humboldt County the redwood bottom lands and flats make first-class agricultural land when cleared, and if seeded to clover furnish excellent pasturage. Much of the land, after the timber is removed, will be bought up in small parcels and used for farming. Farther south, particularly in Santa Cruz County, most of the redwood land is most suitable for timber production. Although mathematically a paying investment to protect and hold such land for future timber crops, most individual owners do not care to wait for the returns. It thus becomes a State duty to keep these lands under forest. It would be a new policy for the State to acquire and manage such holdings, but the public benefits derivable would warrant such action. Such a step would be premature at present, but if brought to the attention of the people, a sentiment might be created which would bring legislative action.

The redwood manufacturers, almost without exception, deplore the prevalence of fire in the redwood belt. In the northern regions the damage to felled timber is the main economic basis for regret; in Santa Cruz County fires at any time are feared, especially on cut-over land which has partially grown up. There is a very general sentiment against the use of fire in connection with logging, but its use is continued because the feasibility of any other method has not been demonstrated. The desire to inaugurate less wasteful methods of logging is undoubtedly sincere, and the larger redwood lumber companies may be depended upon to heartily coöperate in limiting and regulating the use of fire.

PROPOSED SYSTEM OF FOREST PROTECTION.

The forest laws of California form an excellent basis for a system of forest protection, but they fail in this: that they leave the practical work of fire prevention and control entirely to voluntary efforts, whether by counties or by individuals. This works out badly in two directions. It means that the portions of the State where public sentiment is the more strongly in favor of suppressing fires receive the greatest protection. . Or, in other words, where the public is already careful not to start fires they are also prompt to put them out, and the reverse is true in the portions of the State where the sentiment is not so strong. Furthermore, it means that in most cases patrol is neglected in favor of fire fighting, for the reason that patrol requires a constant expenditure, though comparatively small, while there is always the chance that the cost of fire fighting will be reduced to zero through a combination of lucky circumstances. The present system is, therefore, strongest where strength is least necessary, and looks more to remedies than to prevention.

The first requisite is a sufficient number of patrolmen stationed where they are most needed. Section 11 of the forest laws gives the State Forester authority "in times and localities of particular fire danger" to "maintain a fire patrol through the firewardens at such places in brush or forest land as the public interest may require, *the expense of such patrol to be paid by the county in which such patrol is maintained.*"

Strictly speaking, practically all places in brush or forest land constitute "localities of particular fire danger" throughout the summer, but it is assumed that the legislature in enacting the above statute had reference only to extra hazardous conditions. In practice it has chiefly been to make the counties pay the expenses of fighting fires rather than for patrol pure and simple. County supervisors as a rule consider it unjust that the State should assume the right to spend the county money on patrol without sharing the expense. They are readier to settle for the expenses of a fire after it has occurred.

In order to deserve the authority that it has in handling the forest fire situation, the State must spend its own money. An appropriation of $25,000 per annum is asked for this purpose, to be spent in connection with an equal sum to be obtained from the counties. It is not advisable to relieve the counties entirely of their present responsibility. It keeps them alive to the danger of fires, and interested in their prevention. The terms of the coöperation between the State and the

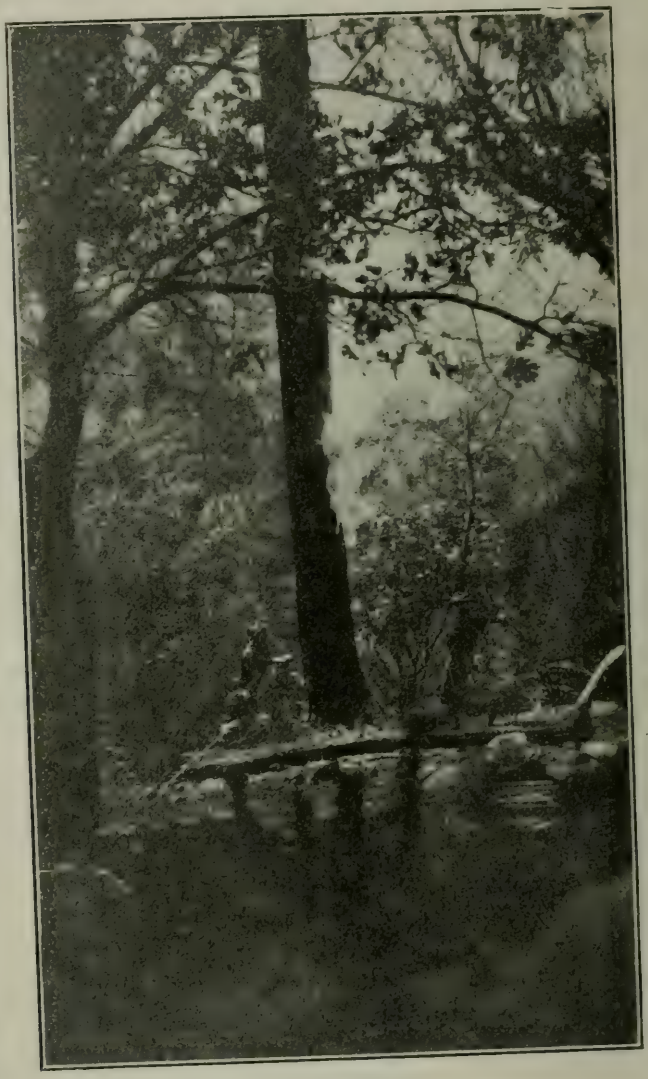
county are to be fixed by agreement between the State Forester and the supervisors, the State's share of the expenses to be not more than half, nor more than $1,000 in any one county in any one year. Such a sum would amount to about one sixth of a cent for each acre of forest and brush land, and there is no question that the expenditure of this much would be justified by results. There is the further reason that it will distribute the loss from forest fires more equitably. At present the best forested counties are often the least populated, and when fires occur the loss falls on those who are least able to bear it. The forests benefit the valley counties and cities as much as they do the counties where they are actually located, and it is only just that the former should help to pay for their protection. Certain forested counties may refuse to coöperate with the State on those terms. But the offer of coöperation on the State's part gives it more of a moral right to insist than it has at present, and the provisions of section 11 should be retained as far as those counties are concerned, although, instead of paying nothing, the State might well afford to pay one third the cost, collecting the other two thirds from the recalcitrant county.

The protective system that will result from such a coöperation will be different for different counties. In some it will be most advantageous to spend the bulk of the money on patrol. In others a larger proportion must be held in reserve for contingent expenses. And again it may be most profitable to clean up dangerous places.

As an instance of the present unsatisfactory state of things the following example may be given: A serious fire started near Forest Hill, in Placer County, on August 31, 1910. The front of the fire was so long and the wind blowing so hard that the combined efforts of every one capable of rendering assistance could not stay its rapid advance. One of the voluntary firewardens reported the situation by telephone and asked prompt assistance of this office that the town might be saved from total destruction. Being without funds for forest protection, and without a paid force of rangers competent to handle forest fires, it seemed as though nearly 300 families would be rendered homeless because of the failure of the State to appropriate money for handling a most important part of forestry work.

A coöperative agreement recently entered into by the Department of Agriculture and the War Department makes it possible for the Federal Forest Service, in case of emergency, to secure assistance from the army for the suppression of forest fires when government timber is in danger. It so happened that the 60th and 147th companies, coast artillery, under the command of Major A. W. Chase, were camped in Auburn, having just returned from destructive fires in the Canada Hill country. This office had been represented at these fires, which afforded

an opportunity of becoming well acquainted with the officers, and a chance to discuss the fire situation at some length. Major Chase was asked to render assistance in this particular case. His orders would not

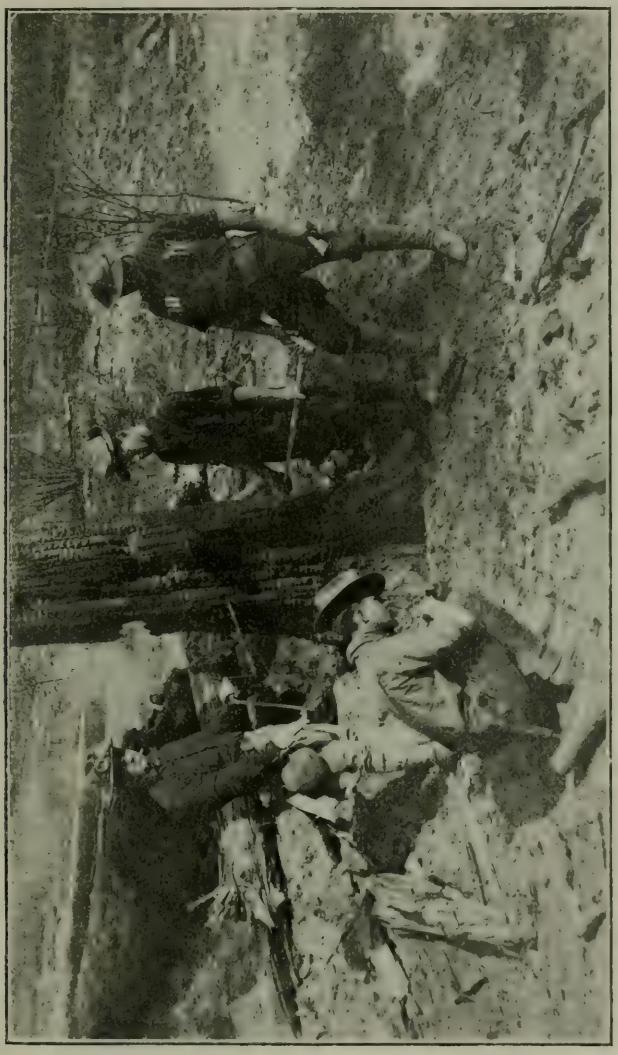


Dynamiting Snags.

After the fire line is established there are usually many burning snags from which sparks and coals are blown. These must be felled promptly, and the use of dynamite has proven most successful.

permit, however, so the matter was taken up with the Adjutant General in San Francisco, who very generously complied with the request. Within an hour after the fire was reported 175 men were on their way to the firing line, and 80 men were on it by ten o'clock in the evening.

Both officers and men fought the fire steadily night and day, checking it at the very limits of the city. In addition to the usual methods employed in fighting large forest fires the use of dynamite was successfully tried out. High winds prevailed and dead trees were numerous,

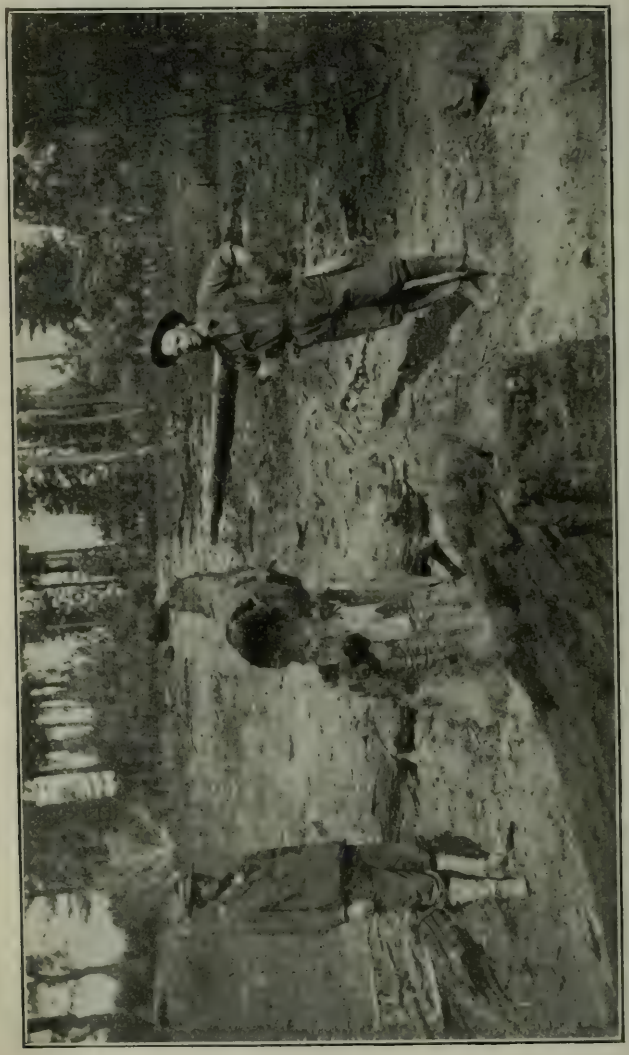


Dynamiting Snags.

United States soldiers in command of Lieutenant Crissy, timing a fuse and preparing to blast down a burning snag.

which, when once on fire, are most dangerous. It was necessary to remove them quickly to prevent the fire from jumping the trails, so several details, each in command of a lieutenant, were supplied with an auger and a box of dynamite. Each detail covered a designated distance. The process was simple and effective. A horizontal hole was

first bored two thirds through the tree and a second about one inch above the first but at right angles to it and to the same depth. These holes were then nearly filled with dynamite and the charge fired by means of cap and fuse. In every case the tree or snag was thrown by the first



Dynamiting Snags.

This snag was blasted down. Notice the comparatively clear cut. With a little experience trees can be felled in almost any direction.

shot. While the stumps were badly shattered yet the cut was pretty clean. It was found by varying the relative positions of the auger holes that a tree could be felled by dynamite as accurately as if a saw had been used.

The principal business in hand was therefore accomplished in this

instance very easily. A fire which would have proved very disastrous was promptly put out because means happened to be at hand for the purpose. But there remained the bills to be paid. The War Department provides the services of the soldiers and their regular daily rations, but not their transportation nor the extra rations which were consumed. Since the State had no funds to use the county supervisors were called upon, and after some delay the matter was adjusted. But the delay caused serious inconvenience to some of the men who had claims to present, and doubtless they will be far less ready to assist in case of another fire.

Prompt work can only be secured with certainty by having men on the ground where they are most needed. In order to do effective work they must be paid. The volunteer firewardens, of whom there are more than 700, do excellent work. In fact, they perform much more in the way of fire protection than could reasonably be expected of them. But it would be unreasonable to ask a volunteer to spend much time investigating a suspicious smoke in some inaccessible portion of the mountains without compensation. Yet it is just such activities that are absolutely necessary to keep down the fire bill, for the cost of fires increases not in direct ratio to their size but in a geometrical progression.

Furthermore, the patrolmen must have facilities for settling bills promptly. At present the delays though necessary are most distasteful to the claimants; and since payment depends entirely on the state of mind of the county supervisors, there is no certainty that the bills will be paid at all. This must be remedied if we are to count on the coöperation of those whose help we need the most, namely, the mountaineers.

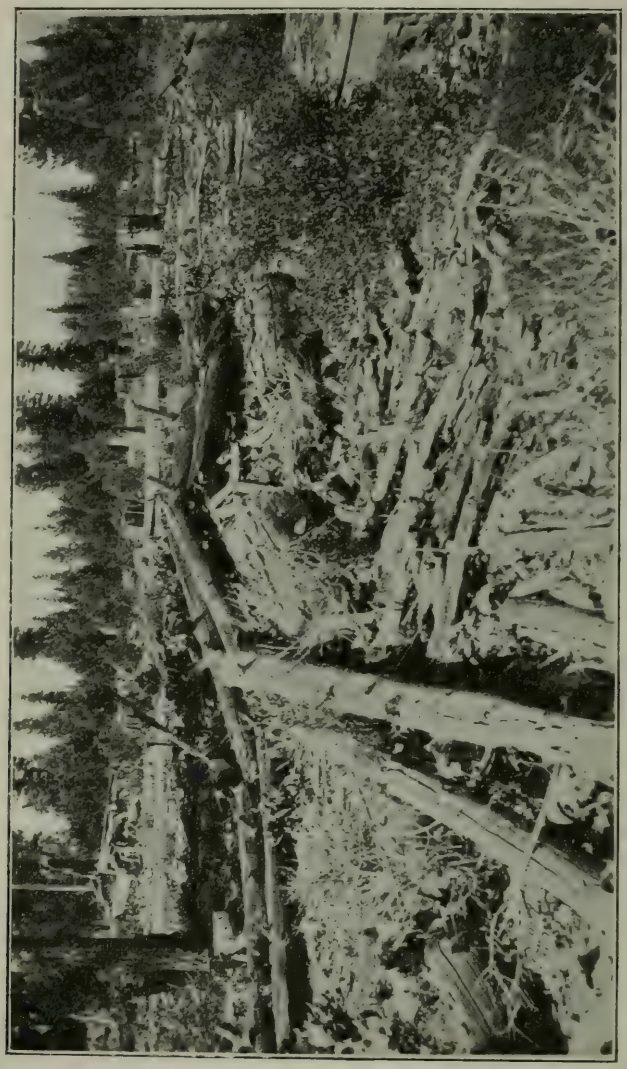
This subject is again considered in the chapter on the forest laws, page 145.

TREE SQUIRRELS.

The present state law, approved March 21, 1907, provides that "Every person who, between the first day of January and the first day of September of the same year, hunts, takes, kills, or destroys, or has in his possession, any species of tree squirrel, or who at any time buys, sells, offers for sale, or has in his possession for sale, any tree squirrel, is guilty of a misdemeanor; and every person who takes, kills or destroys, or has in his possession, more than twelve tree squirrels during any one open season, is guilty of a misdemeanor."

This provision should be abolished. Forest fires do the most direct damage to the forests, but the tree squirrel does almost if not quite as much damage annually in an indirect way. There are thousands of acres in the State not now producing merchantable species which could be made to bear a profitable timber crop if the seed was not

destroyed. Some of the area must of necessity be sowed artificially. The species best adapted to the work are for the most part sugar and yellow pine. Tree squirrels live chiefly upon sugar and yellow pine seed. They cut most of the cones before maturity and eat or store for



Slash.

Slash left on the ground after logging, forming a fire trap. This should have been piled in open places and burned at a time when there was no danger of the fire spreading.

the winter most of the seed that ripens. This practice almost prevents natural reproduction on cut-over lands, and renders seed collecting upon a large scale very uncertain and expensive.

In the national forests alone it is estimated that there are 600,000 acres destitute of growth, due chiefly to repeated fires before the areas

were put under administration. The Forest Service expends nearly $35,000 annually in California for reforestation and collects from 5,000 to 10,000 pounds of seed for proper sowing. Such work is being very seriously hampered, and upon private lands not under forest management, natural reproduction is far from what it might otherwise be. The Forest Service has very generously furnished the summary of the reports of eleven technically trained foresters, all of whom are careful observers and have spent a great deal of time on the ground. Each agree that the tree squirrel is very destructive to sugar and yellow pine seed; that they are the most harmful of all animals to reproduction; and that the lack of seedlings in many localities is traceable to the squirrel.

It is not the intention of this office to condemn any living thing without first giving careful consideration to comparative values. In this case, however, a young, thrifty forest capable eventually of furnishing a portion of the future lumber supply, is far more valuable than innumerable squirrels romping about portions of the country seldom visited. With this seemingly overwhelming evidence there should be no objection in supporting the recommendation that the above section of the game law be repealed.

FOREST MANAGEMENT.

In spite of the fact that fire has as a rule followed in the wake of the logger, the mountains contain numerous stands of thrifty young growth that has come in since the land was first logged. This is by no means the rule, for fires were almost invariable, but it is of frequent enough occurrence to justify superficial observers in saying that the fire problem is paramount and that the practice of forestry, in the Sierras at least, requires nothing more than to log after the usual method, clean up the area by carefully burning the slash, and let the forest reproduce itself. Undoubtedly fine stands of young growth have resulted from just such methods, applied not by design but by chance. The holdings of nearly all the older operating companies include such stands, though they are often too small in area to be of much account. As a rule they date back thirty to forty years, and it is the fact that they are the result of early logging operations that is often lost sight of. Ordinary logging methods of that period approached more nearly to forestry methods of the present in regard to the single item of the size of the trees taken than they do now. To take an example from a Government timber sale on a national forest: The forest consists of trees of all ages and sizes. The trees to be removed are marked by a forester who constantly bears in mind the crop that is to follow the present

cutting. In consequence he does not mark all the trees that the purchaser would perhaps like to take. He leaves all of the small trees of the valuable species and some of the medium size trees as well. He figures that this latter class, although they will yield sufficient lumber to pay for their cutting, hauling, and sawing, nevertheless are growing too rapidly to make the present utilization of them profitable in the long run. In other words, he believes that if left to grow for a period the additional wood they will put on, which will also be of superior quality, will be sufficient to offset the interest on the money that the trees would bring if cut now. There are other considerations that guide the government forester, but this one is of particular importance to the private lumberman. For the private lumberman of thirty or forty years ago left much the same sort of trees that the government forester leaves now, though his reasons for doing so may have been entirely different. He did not consider the future at all, but thought only of his present profit, and at the period in question the sort of trees mentioned could not be taken out without actual loss.

The question whether a lumberman is going to make money on a particular tree or not depends on the cost of cutting, hauling and sawing as compared with the value of the product. The latter depends upon the public demand. It is easy to see that conditions of demand have changed materially in the last forty years, and that increased population and the development of, for example, the fruit industry, have created a demand for low-class lumber products that did not exist in former times. It must be remembered that even the best tree contains chiefly lumber of a common grade. The center is always knotty no matter how clear the stem may look. Generally speaking for the same species, the larger the tree the greater the proportion of clear lumber it contains, and conversely, the smaller the tree the less first-class material. The first-class lumber is more easily disposed of. Therefore, with a limited demand for lumber and many mills supplying it, the common lumber that is produced as a necessary accompaniment to the clear lumber is as much as can be disposed of, and trees that contain nothing but common grades are quite unmerchantable.

This was the condition that obtained when the young stands were produced, and these stands are able to reach merchantable size a second time in thirty or forty years, simply because when they were originally cut over a large number of trees of middle diameters was left. If the present day lumberman cuts everything he can make a profit on so little remains that even with perfect protection from fire the new growth would probably not be ready to be cut again for sixty to eighty years. Therefore, if the lumberman's policy is simply to secure present profits, he will not voluntarily practice forestry, and this is, as a rule, the policy of the smaller operator. His tract, being small, is soon cut over, and

when it is stripped he is through with it forever, unless he can use it for agriculture or some purpose other than the growing of trees. Most of the cut-over lands that have reverted to the State for non-payment of taxes have been abandoned on this principle.

Many large operators, however, have sufficient virgin timber to last them for thirty to forty years. These realize that if, at the end of that time, when their present holdings are completely cut over, they can return to the portions first cut and log them a second time with profit, it will be good business policy to do so. A large proportion of the cost of logging comes from necessary improvements that are more or less permanent in character—roads, railroads, grades, camps, and the like. If, instead of making a single crop of timber pay for these improvements, the cost can be distributed over two or three rotations, the profit per thousand will be appreciably increased. By logging under such restrictions that they can be sure of adequate second crops after a certain number of years, and by making their annual cut such a proportion of their whole area that they will reach the end of their virgin timber at the time when the area first cut over reaches maturity, they can log indefinitely from the same tract and make the fullest use of these improvements.

Another circumstance that is driving lumbermen toward the practice of forestry is the ever increasing difficulty of purchasing virgin timber cheaply. Virgin timber is no doubt of better quality than second growth, for the reason that the trees are generally larger and contain a greater quantity of clear lumber. As long as the supply of cheap virgin timber appeared to be practically unlimited there was therefore no special incentive toward forestry, especially as the menace of fire destruction was so constant. But nowadays, although there are great quantities of virgin timber still remaining, it is no longer cheap.

The present day logger acquired his tract principally by consolidating individual timber claims into groups large enough to make logging operations profitable. In order to be profitable the operation had to be carried out on a large scale. The preliminary cost of establishing transportation facilities from the place where his supply of raw material was located to his market was so great that it required a large quantity of lumber to pay for it. In consequence, claims were worth little unless they could be joined with other claims to form a solid holding of large size, and the individual owner received very little for his claim. Now, however, the individual holdings are pretty thoroughly consolidated into big ones, and transfers are made on a stumpage basis instead of at so much per acre. The fortunes that have been made in lumber have resulted as a rule from the acquisition of the necessary raw material at a low price.

Therefore, the logger who has cut over his tract and is looking for more is at a great disadvantage, because more is not to be had except at a

considerable increase in price. In former times there was, so to speak, an "unearned increment" that resulted from the consolidation of the individual claims. Nowadays this increment has been pocketed by timber speculators and the operating logger pays for it. This makes him readier to look with favor upon any plan that will enable him to cut continuous supplies from his present holdings without going into the market for more.

The logger is, therefore, ready to hear what the forester has to say. The most progressive have taken the first step voluntarily and prepare their land for seeding after it has been cut over by burning the débris that is left. As soon as they can be shown just what profit there is in sawing the trees of the smaller merchantable sizes, as compared with the profit of leaving them to grow larger and better, they will undoubtedly adopt the methods of forestry as willingly. And if this is true it will solve the problem of forest conservation in this State in amicable fashion and without having to resort to compulsory legislation. The data that must first be obtained, however, are many and complicated. Each species must be studied with reference to its habits and rate of growth in different situations, and also with reference to its yield at different ages. This will necessitate experimental tracts located throughout the State on which continuous studies can be made. The results of these studies being compiled will give the lumberman exactly the information he must have if he is to adopt forestry principles intelligently.

State Tax Lands.

It is possible that in the future, as to some extent in the past, deforested lands will be sold to the State for nonpayment of taxes. Where such lands have been so badly treated that they can not reproduce, they remain unredeemed and unsold, although they might prove to be very desirable lands for experimental forestry purposes. But the State could hardly conduct long term experiments on lands subject to redemption. I suggest, therefore, that in future when lands are sold to the State for nonpayment of taxes they be held for a reasonable time subject to redemption or sale; that on the expiration of this period they be examined by a competent board, and if found more valuable for forestry than for other purposes, that the right of redemption or purchase be canceled, and the lands turned over to the State Forester for administration.

Provision should be made for the exchange of these lands on an equitable basis, with other land owners, including the Federal Government, in order that a consolidated tract may possibly result from the exchange of isolated small areas.

FOREST EXTENSION.

With respect to a particular piece of forest land the object of forestry, simply stated, is to make it produce timber at its utmost capacity. Similarly with respect to a whole state the purpose of the State Forester should be to see to it that all lands which are chiefly valuable for the production of wood are actually used for the purpose. California contains many thousands of acres which at present are not doing their duty in this respect. The subject of forest extension is therefore one of great interest to the welfare of the State.

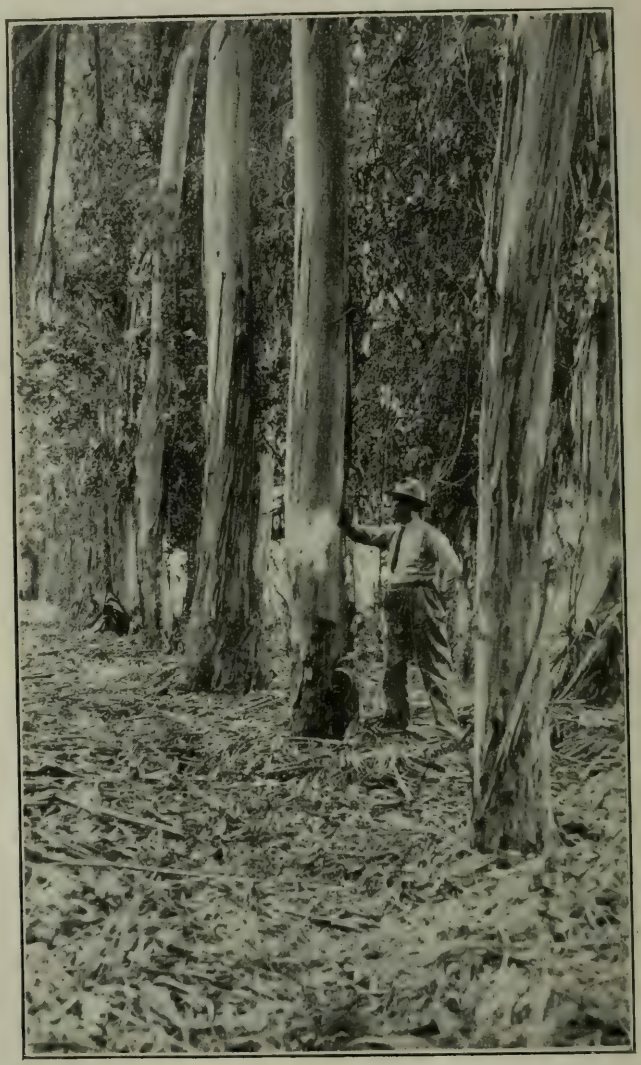
This rather cumbersome expression is used to comprise two still more unwieldy terms, "reforestation" and "afforestation." The former applies to the restocking of lands once forested but since denuded by wasteful lumbering methods or fire, or more often both. By "afforestation" is meant the establishment of forests on land which never before produced forest growth. Both reforestation and afforestation are important, but the former especially so, because the land which has been denuded of its forest is, as a rule, less valuable for other purposes, and consequently comparatively more valuable for forests than the naturally open land. The two problems are not equally easy to solve, and it happens, unfortunately, that the problem of reforestation is much the more difficult.

TREE PLANTING.

The pioneer settlers of California, accustomed to the well wooded Eastern States, found the treeless valleys unattractive for habitation, and early in the agricultural development of the State tree planting for shade and ornament about towns and ranches received attention. This class of planting has done much to relieve the monotonous appearance of the wide, level valleys. The severity of the winds in some portions of the State has rendered the planting of wind-breaks and shelter-belts, as in the treeless prairies and plains of the Middle Western States, necessary for the protection of crops and for the comfort of the resident population. The need for fuel wood in some sections of the valleys has induced commercial planting for timber production. The greatest stimulus to tree planting has been given by the introduction of the eucalyptus, and the extensive use of these rapid-growing trees has always prevented discouragement with tree planting in California.

The great majority of the trees planted are not indigenous to the State. They are mainly trees of the Eastern States and foreign countries planted far out of their native range. In the mild climate of the valleys nearly all introduced trees, including practically all the species which have been planted in any section of the country, have made successful growth.

Planted timber has not been grown longer than fifty years, and most species have not reached a greater age than thirty-five years. However, the planted species have shown no tendency to become short-lived or

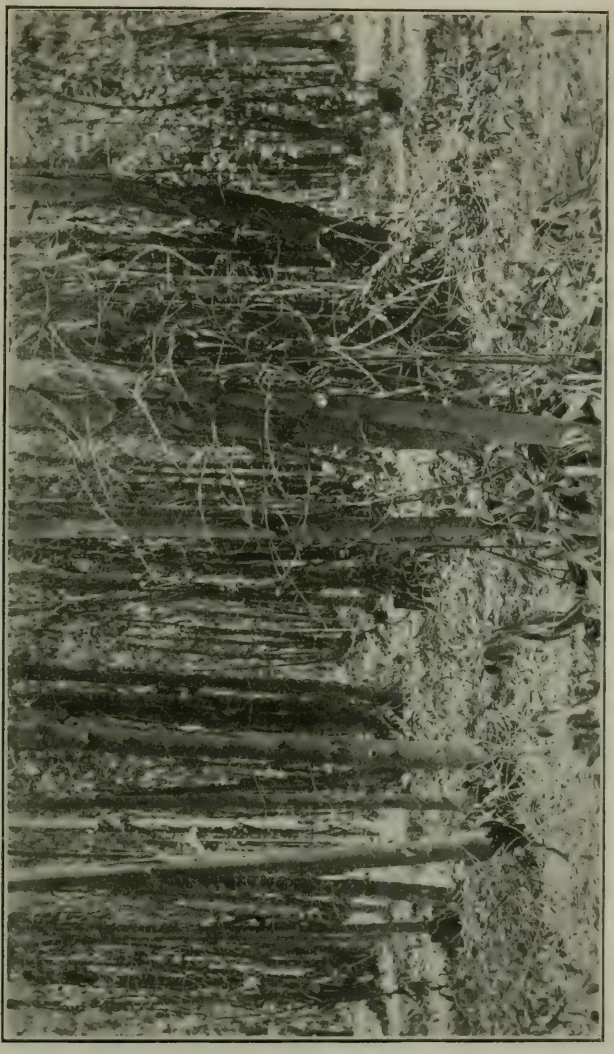


Eucalyptus Globulus.

Twenty-year-old plantation, San Pasqual Valley. Trees vary from 15 to 30 inches in diameter, and from 125 to 165 feet in height. Most of the trees were cut in 1910. They grew on very good land.

unthrifty with removal from their native range. Eastern trees accustomed to a winter season of cold, during which growth activity is dormant, have a much longer growing season when planted in this State. The mild climate and the abundant moisture during winter months

should tend to maintain and stimulate growth throughout the year. However, the deciduous hardwoods lose their leaves at the same season of the fall here as in the Eastern States. Despite this fact, the rate of



Eucalyptus Globulus.
Cut-over blue gum plantation, showing the manner in which this species sprouts.

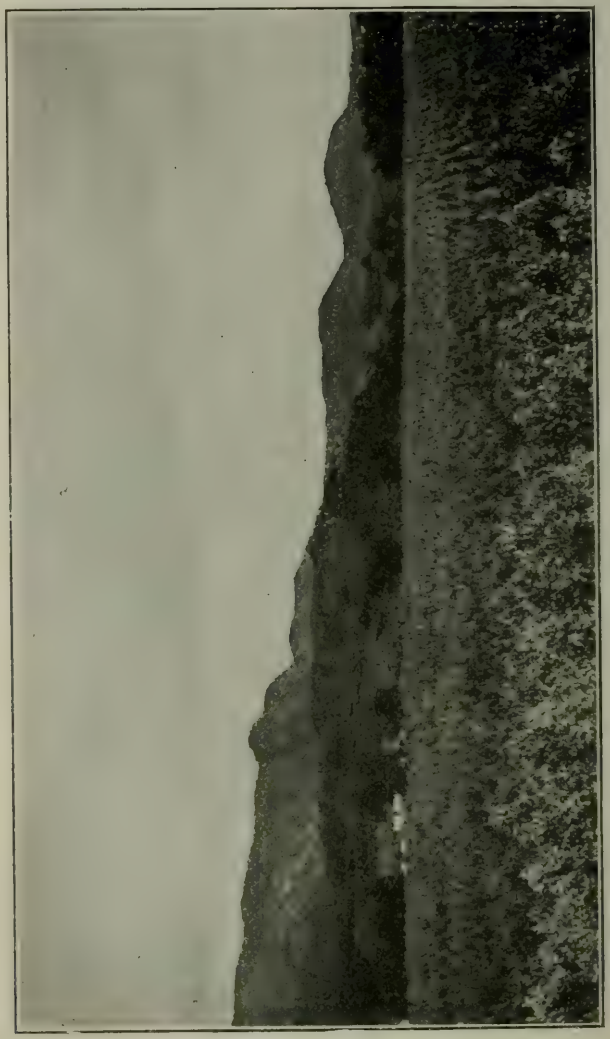
growth of many trees is more rapid under favorable conditions here than in their native range.

The scanty rainfall in the valleys and the drought during summer months have proved unfavorable for the growth of some trees, and when planted their development is slow or stunted.

However, the favor in which eucalyptus have been held, and their selection for extensive planting, have discouraged somewhat the use of

other species. Commercial plantations and groves planted under the timber culture act, which have succumbed to drought, are rarely found.

The endurance by many of the eastern trees of the drought conditions encountered in the interior valleys has been little tested. Many have



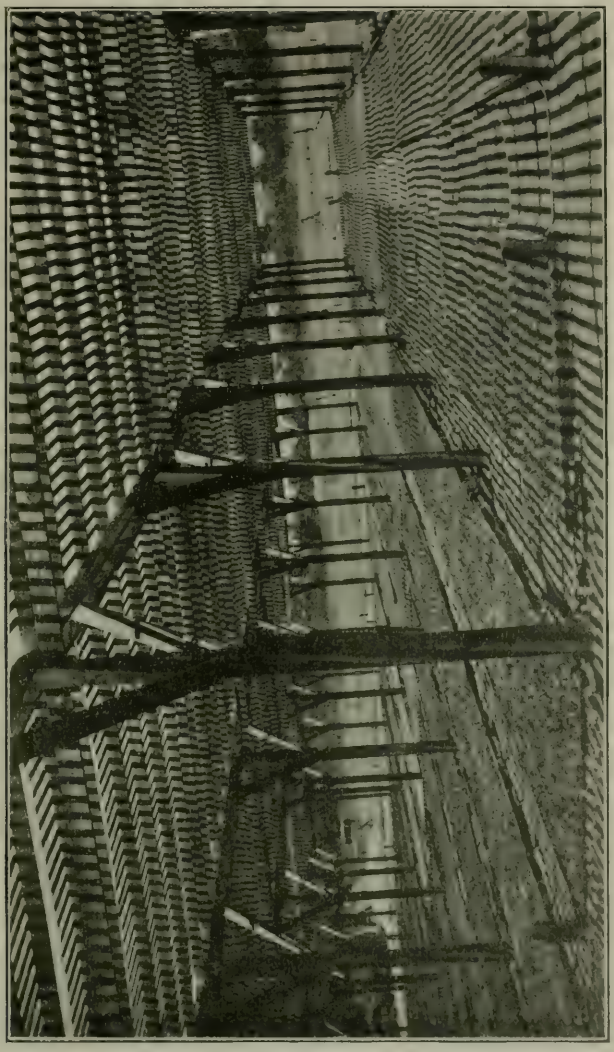
Eucalyptus Globulus.

Fifteen-months-old blue gum plantation in the Escondido Valley. This shows the results that can be obtained under proper management, and above all, with good land.

been planted only at Chico, in the Capitol Park at Sacramento, and about the streets and parks of other towns. Park or street trees are generally irrigated or subirrigated so that they are obliged to endure little drought. Consequently, the successful growth of many of the eastern hardwoods in towns in the interior of the State does not estab-

lish their endurance nor their value for commercial planting in the open valleys.

California has become known as a tree-planting state mainly on account of the planting about the towns and ranches in the valleys, and



Eucalyptus Nursery.

Most nurserymen prefer the lath house to other ways of growing eucalyptus seedlings. The sides and top are built in sections, to permit of their removal while hardening the young plants.

because of the extensive planting in southern California for fuel wood and for protection to citrus crops. Protective planting has followed extensive agricultural development, and planting for shade and ornament has kept pace steadily with the settlement of new sections of the valleys. However, in the interior valleys where stock and grain crops

are chiefly raised very little protective planting has been done, and in every section of the State commercial planting has been undertaken on a very limited scale.

Commercial plantations have been mainly set out for fuel wood production in the south where the occurrence of valley timber is scanty. The need for this product is largely supplied in the northern valleys by the cutting of the scattered oak groves. Despite the lack of native hardwood timber no commercial planting has been undertaken to raise this product. The abundant supply of suitable timber in the mountains has diminished the necessity for planting for fence post production.

Wind-break Planting.

Trees have been planted most extensively in wind-break lines for the protection of crops and orchards. The need for such protection is great in many sections and the benefits derived are so well understood that there is little need of advocating wind-break planting. Wind-break systems have been most extensively developed for the protection of citrus crops in the south. An extension of a similar system of wind-breaks into other sections of the valleys, where winds are severe but where at present wind-breaks are little used, would undoubtedly greatly benefit crop production and permit more extensive agricultural development. Not only citrus orchards, but orchards of deciduous fruits, vineyards, and agricultural crops benefit from wind-break planting, either by the prevention of injury from the force of the wind or by the protection from frost which the lines of trees afford.

Eucalypts.

Eucalypts have been the trees most extensively planted for wind-breaks throughout every period of the agricultural development of the State in all the valleys where conditions are favorable for their growth. The almost exclusive use of these trees for this purpose has prevented the planting in California of shelter-belts of the variety of native hardwood trees commonly used for protection in the Middle Western States. Owing to the height they attain and to their superior rate of growth, eucalypts are ideal trees for wind-break planting. However, the wide-spreading root development of eucalyptus wind-break lines and their moisture-sapping effect upon the soil is frequently injurious to the crops which they protect. This fact has brought them somewhat into disfavor for planting in some sections of the valleys. With proper management, no injury to crops results from the use of eucalypts for wind-breaks however, and in all parts of California within their planting range the use of these trees for wind-break planting is advisable. For certain purposes and in certain localities, however, other trees should be preferred.



Monterey Cypress.

Wind-break for the protection of citrus and deciduous orchards in the Santa Ana Valley. Trees planted in a single row form a dense wind-break. They are about fifteen years old and 40 feet high.

Monterey Cypress.

Monterey cypress has been the greatest competitor of the eucalypts for protective planting in California. The tree has been extensively planted throughout most of the valleys, and in some respects it is superior for wind-breaks to nearly all other species. In its native range the cypress is a seacoast tree, but it grows thrifty in the interior valleys. It is naturally a long-lived tree, and does not become short-lived when planted away from the moist climate along the coast. Cypress has considerable capacity for drought resistance, and trees rarely die from drought. It is grown successfully without irrigation in very dry situations, and may be planted in all the interior valleys except in the semi-arid portions of the State.

Cypress is chiefly valuable for wind-break planting on account of its habit of growth, tolerance, and drought resistance. The tree is dense-foliaged and spreading, and, naturally retaining branches to the ground, a row of the trees forms a dense shelter and offers strong resistance to the force of the wind. Trees die out of cypress wind-break lines only on account of too close crowding, and for best results, the trees should be spaced about four feet apart. The dense foliage and spreading habit render a single row of trees ample for protection.

Cypress is inferior for wind-break purposes only on account of its slow growth. Protection for crops is gained slowly, but cypress is often planted in preference to eucalypts on account of its moderate demands for soil moisture. Cypress wind-breaks lines interfere but little with the growth and production of crops and orchard rows planted close to them, and do not unduly deprive them of moisture. They not only take less moisture from the soil, but they take up less room than the eucalyptus wind-breaks. Cypress should, therefore, be selected for planting within the higher shelter of eucalyptus wind-breaks where additional lines of trees are desired for protection at short intervals through fields and orchards. Cypress is the best species for wind-break planting along the coast. Here, eucalypts are seriously injured by the force of the wind. They generally grow slowly and do not reach normal height, while cypress is but little affected by wind action.

A most effective wind-break is a combination of cypress and eucalyptus. The latter soon clear their lower stems of branches, and if planted alone give entrance to the wind below their crowns. But when planted together, the cypress row forms a dense understory; to prevent the cypress from suppression, however, the two species should be planted in separate rows rather than alternating in a single line.

Guadalupe and Italian Cypress.

On account of its greater endurance of drought Guadalupe or Arizona cypress is recommended for wind-break planting in dry situations in

preference to the Monterey cypress by some California planters. Other planters have used the Italian cypress instead of the native tree. However, the Italian cypress is of very slow height growth, and is a shorter-lived tree. Its slender development makes it inferior for wind-break purposes to the spreading Monterey cypress.

Monterey Pine.

Monterey pine has been planted to some extent for wind-breaks in the San Joaquin Valley and in the valleys of southern California. The rapid growth, bushy foilage, and spreading form of the tree render it suitable for this purpose, but its use is generally inadvisable on account of its short life. But for this fact the tree would be superior to any other except the eucalypts for wind-break planting, affording all the good qualities of the Monterey cypress in density of shelter, but growing rapidly to 80 or 100 feet in height.

Monterey pine is a seacoast pine, growing naturally on sand plains and over dry hills in a very restricted range along the shores of Monterey Bay. It is quite short-lived even in its native range. The usual limit of its longevity is eighty-five to ninety years, and trees of the most venerable appearance in the groves near Monterey are rarely over seventy-five to eighty years of age. The tree thrives best under the influence of the humid coastal climate, and when planted in interior valleys away from the coast it becomes very short-lived. Planted trees can not be depended upon to live for more than thirty-five years. When planted for protection trees frequently begin to die out in fifteen years, thinning the wind-break and defeating the purpose of its planting.

Throughout their lives planted trees grow rapidly and thriftily, and do not appear to suffer from heat and drought. The shortness of its life when planted in the interior valleys is possibly due either to the effect of the dry climate or to the over-stimulation of growth during the long growing season. (It may result, however, from the attacks of a wood-mining insect, which has killed trees and seriously injured the groves at Monterey Bay and which may have become generally disseminated throughout the State.) Planted trees in any portions of the valleys are likely to die at any time between the ages of fifteen and thirty years. The foliage of trees of most thrifty appearance gradually becomes thin and pale-colored, and as they die down from the top, the foliage turns brown and gradually falls. Bark-boring insects frequently attack dying trees, but it has not been ascertained that they are the cause of the decadence.

Incense Cedar.

The capacity for drought resistance of the incense cedar enables it to grow thriftily in valley situations, and it has been planted to a limited extent in the interior valleys for wind-break for citrus orchards. The

bushy development of the tree makes it suitable for wind-break planting, but in the valleys it grows slowly in height. It is not superior to Monterey cypress for wind-break, and it is most valuable for variety, where the ornamental effect as well as protection is a factor in the planting.

Hardwood Wind-break Trees.

Coniferous trees are most desirable for wind-break planting because they are evergreen. However, several hardwood trees have some merits for wind-breaks, and have been planted upon a limited scale for this purpose in the California valleys. Most species are deciduous, and inferior to evergreen trees, since they furnish protection for a portion of the year only.

Aside from eucalypts and conifers, cottonwood has been planted most extensively for wind-breaks. It is useful for protective planting in the valleys where the severity of the winter climate prevents the planting of eucalypts. The cottonwood is comparatively short-lived, but it makes a good wind-break tree on account of its rapid growth and spreading development, and the height it attains. It is hardy to winter cold, but requires abundant soil moisture for successful growth. It will not endure the lack of soil moisture in the drier interior valleys, but if water is supplied by irrigation the tree grows thriftily in the most arid sections of the State. For effective protection cottonwood should be planted in double rows. The "cotton" produced by fruiting cottonwood trees in the early summer is somewhat detrimental to the use of the trees for planting. To avoid this, cuttings from the staminate form of the tree, called the Carolina poplar, should be planted, since this variety produces no cotton.

Lombardy poplar has frequently been planted for protection in the valleys where the use of cottonwood for this purpose becomes necessary. However, the slender form and light foliage of the poplar makes it inferior in every way to the cootonwood for wind-breaks.

The blackwood or black wattle has been planted to some extent for the protection of citrus crops. It is an evergreen tree of fairly rapid growth, and a row of the trees furnishes quite dense protection. It is not suitable for planting in dry situations, however, and since it is intolerant of frost it may be used only within the planting range of the eucalypts. It is inferior to these trees for protective planting in most cases, but is useful for planting along avenues, where the wind-break is also to serve the purpose of ornament.

The possibility of growing black locust in dry situations and in the valleys where the eucalypts may not be grown makes this species commendable for wind-break planting in some cases. When planted with abundant space for development, however, the tree is spreading in form and does not reach sufficient height to afford adequate protection to

crops. It is generally inferior to cottonwood for wind-breaks, but it may be recommended for planting where a low shelter-belt is sufficient, or where the wind-break is also valuable for ornament.

A similar capacity for drought endurance makes the green ash useful for wind-break planting for the same purposes and in the same situations as the black locust. Green ash is even a superior species, because it tends to more rapid height development.

Pepper tree has been planted occasionally for wind-breaks for citrus orchards. Although an evergreen tree, it is not suitable for protective planting. Its wide root development saps soils of moisture as greatly as do the eucalypts, and the tree is also too low and spreading in its habit of growth to give effective protection.

Seacoast Planting.

Along the seacoast the shelter from the strong west winds furnished by protective planting often renders great service in the increased comfort of residents of towns and ranches. Wind-break planting may also be relied upon along the coast to prevent sands from drifting or for the fixation of moving dunes. Wind-breaks should be planted to seaward of the drifting sands in order to protect the light soils completely from the wind action. Eucalypts or Monterey cypress are the best species for shelter-belts planting for these purposes. Where sand planting for protection is to be practiced on an extensive scale the use of eucalypts or Austrian, Monterey, or maritime pine may be recommended. Torrey pine, though of slow growth, has been found satisfactory in very sandy situations.

Irrigation Planting.

The planting of wind-break lines along the canals and ditches of irrigation systems to reduce evaporation from the exposed water surface has been advocated. It is believed, however, that planting for this purpose will not generally be advisable. The Reclamation Service estimates that the evaporation from the surface of flowing water in irrigation ditches in California is less than 2 per cent of the volume of the water carried. If wind-breaks are planted close enough to ditches to prevent this evaporation the trees will supply themselves with moisture from the irrigation supply and in attempting to obtain it their roots are liable to break the cement or stonework of the ditches. The loss of moisture resulting from such leakages would considerably exceed that lost by evaporation when ditches are exposed. If planted at such a distance that their roots can not interfere with the system, little protection from evaporation will be secured. Besides, in arid sections of the State, few trees planted in this manner would make successful growth. It seems, therefore, that such protective planting would be of little use.

Watershed Planting.

The protection and improvement of the forest or brush cover upon watersheds, upon which sections of the valleys are dependent for their water supply for irrigation, is of great importance in California. Where watersheds are denuded or untimbered, as in the coast ranges or in the chaparral-grown mountain foothills, improvement is best secured by forest planting.

Future Commercial Planting.

Commercial tree planting in California has been confined in the past to the fertile valley lands, the waste lands having been neglected for this purpose. But the value of the former is steadily rising with the development of water for irrigation. Large holdings on which stock and grain were formerly raised on an extensive scale are now being subdivided, colonized, and put under intensive cultivation, to which the greater part of the valleys is well adapted. The development of the State in this respect has hardly begun as yet, and in view of this it is probable that in the future only the inferior valley lands will be used to tree-planting, the more fertile being devoted to more profitable agricultural or horticultural crops. Only those trees of the highest commercial value or most rapid growth may be considered at all for commercial planting and even these will rarely prove profitable in competition with crops that yield annual returns. Owing to their rapid growth and high commercial value, eucalypts will be favored over other species in the selection of trees for future planting, and only a few species besides them are worth planting for commercial purposes.

Fuel Wood Planting.

The mildness of the climate during winter months renders wood fires adequate for comfort throughout the greater part of the California valleys, and the lack of handy supplies of coal has always stimulated the use of wood for fuel. Supplies of fuel wood have been obtained by the cutting of scattered groves of valley oaks and from timber transported from the mountains and the desert. The valley oaks have mainly supplied the needs of the northern valleys. The groves have maintained themselves by sprout growth despite injuries from fire and the inroads made by cutting, but their area has steadily diminished. Their timber is of little value except for fuel, and their growth is too slow to warrant their commercial planting.

In southern California the remoteness of fuel supplies has led to the planting of groves of eucalypts, and local needs have been supplied from this source for many years. The demand for accessible local fuel supplies is constant in this section, and the planting of eucalypts has been profitable. In more northern valleys there has been little fuel wood

planting, but the planting of eucalypts for this purpose will undoubtedly be found desirable with the continued clearing of the oak groves from areas of cultivable valley lands.

Other trees planted for ornament or for wind-break are occasionally cut for fuel. The silk oak grows quite rapidly and the wood is esteemed for fuel. Pepper tree is also a rapid growing tree which furnishes good fuel wood, a few small groves having been set out for the purpose. But for fuel wood production the eucalyptus within its range is preferable to all others since no trees compare with these in fuel value and rapidity of growth. In the semiarid valleys of northeastern, eastern, and possibly in portions of the southeastern section of the State, eucalypts can not be grown on account of the rigorous winter climate. Here cottonwood is the best species for fuel planting. Irrigated groves make rapid growth and furnish a fine quality of fuel wood.

Fence Post Planting.

One of the greatest needs of the California valleys is an accessible supply of fence posts. Posts are needed on every ranch and the local timbers are quite unsuitable for the purpose. Redwood has been principally used for posts on account of its great durability, but the rise in value of redwood posts in late years makes it evident that planting for fence posts will be profitable. The trees most suitable for post planting are described in the following pages.

Black Locust.

Black locust is the only native American tree which has been planted commercially in California. Small commercial or timber culture plantations are growing in Modoc, Glenn, Sutter, Stanislaus, Inyo, Kings, Tulare, and Kern counties. With the exception only of the eucalypts, locust is the most important tree for commercial planting in the State. Throughout the valleys it is the best species for fence post planting. Locust wood is of great durability in contact with the soil. Posts last from fifteen to twenty-five years, and are little inferior in durability to redwood. Few locust plantations have been set out directly to supply post timber, and therefore the supply of posts which has reached the market has been very limited. In localities where it has been obtainable, locust timber has come into great favor for fence posts.

The mistletoe common on oaks and other native California trees is often found on individual locust trees throughout the State, but the damage is not serious. The locust is naturally somewhat short-lived, but the oldest trees, little over forty years of age, show no tendency to decadence. Planters, therefore, need not be concerned over the longevity of the tree in California, since merchantable dimensions are reached in ten to twenty years. Under favorable conditions locust makes more rapid growth in California than in eastern states.

Locust has been planted throughout all the valleys of California and has grown successfully even in more arid sections of the State. The tree reaches its best development in the upper Sacramento Valley. In southern California it is affected by the heat and drought, and does not make as thrifty growth nor reach the proportions attained in the northern valleys. The tree also grows thriftily upon dry uplands and about the foothill towns above the interior valleys. It succeeds in alkali soils and in the sandy river-wash areas in southern California. Large areas of waste lands in the valleys are suitable for locust planting.

The tree has a great capacity for drought resistance. It grows successfully without irrigation in Modoc County and in the San Joaquin and Tehachapi valleys. With irrigation trees grow well in Imperial Valley, but attempts to grow them without irrigation in this section would probably be unsuccessful. Locust should not be planted commercially on the chaparral-grown slopes of the Sierra foothills, nor upon the dry, bare slopes of the Coast Range hills. In very dry situations the growth of the tree is slow and it often becomes scrubby and stunted in height. Locust is uninjured by severe winter cold. It grows in the high valleys of northeastern California and may be planted on cut-over mountain forest land. It grows well upon lumbered areas in the redwood belt.

Locust is of more rapid growth than other post timbers which may be grown in plantation in California, and its timber is equal or superior to them in durability. Its capacity for enduring drought gives it a wide planting range through the valleys. Other post trees seem no more drought resisting than this tree, and no more suitable for planting upon dry uplands or in the semiarid valleys unfavorable for the growth of the locust. In such situations plantations of all trees require irrigation. Another reason for planting locust in preference to most other post timbers is that it sprouts readily after cutting.

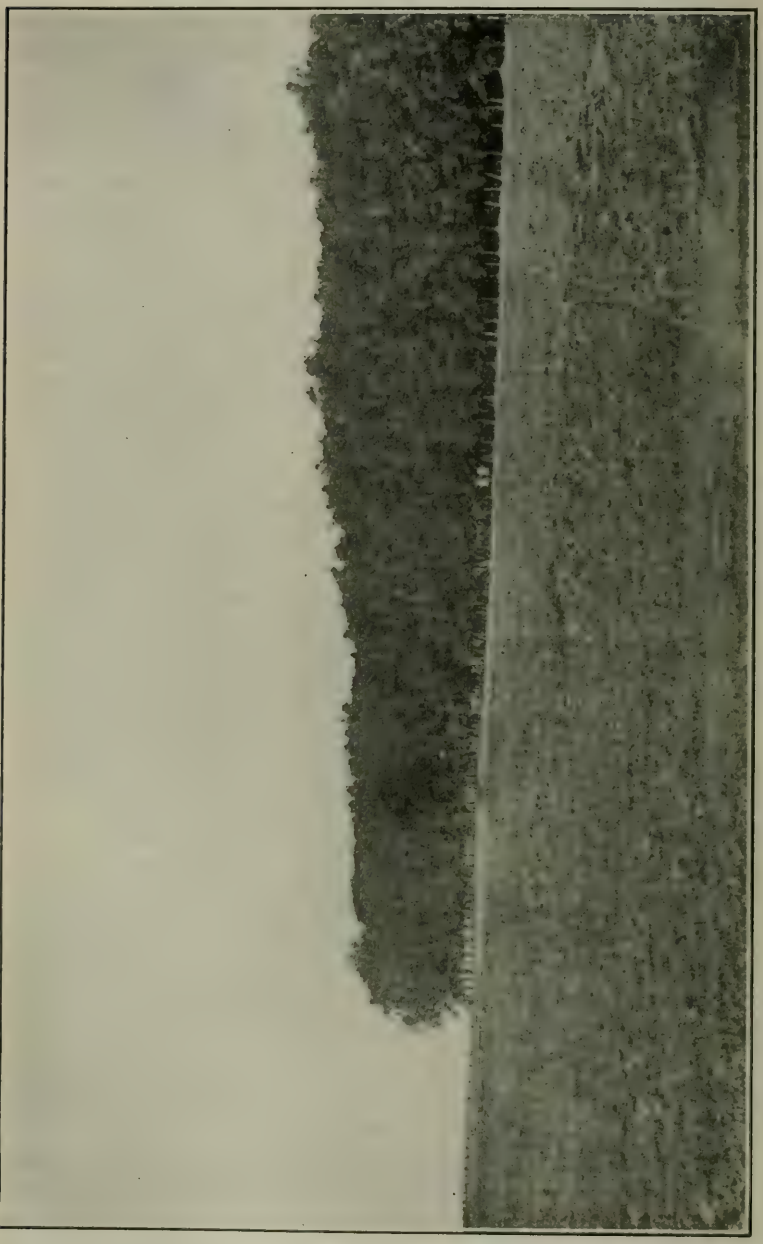
There are two reasons why the rancher of the California valleys should produce his own fence posts. The first is, that during the next ten to fifteen years there will be a decided advance in the price of redwood posts; the second reason is, that in the coming ten years it is entirely reasonable to predict a great development in all of the California valleys. The immense irrigation projects, now talked of, will then be a reality, and with irrigation will come a decided change in the methods of farming. Now fruit and grain growing are about the only industries of this enormous valley, but with the coming of water, alfalfa and corn will be possible—with the corn and alfalfa will come cattle, sheep, and hogs, and the farming will be more diversified in every way. The large grainfields will be subdivided—a large amount of fencing will be required—so, anticipating the future, the ranchers of this region should make locust

plantations now. A forecast of what the Sacramento Valley of the future will be like is got from a visit to the country around the town of Woodland, in Yolo County. Here there is a small irrigating plant, established a few years ago, and stock raising has at once come to the fore.

A rancher of Sutter County set out 2½ acres of locust about thirty years ago—from this plantation the 1,200-acre ranch has been supplied with posts for the past twenty years. Not that there has been a great deal of new fencing done, but this ranch carries a lot of stock all the time, and under such conditions there is a constant need for posts, either for putting up short stretches of fence or for replacing worn-out posts. The owner calculated the plantation had been worth $40 or $50 a year to him for the past fifteen years. More growth figures must be obtained before it is possible to state definitely just what returns can be expected from locust plantations. But from the data at hand it is safe to say that, with good soil and proper management, it can certainly be grown at a profit. Under such conditions locust of suitable size for fence posts should be grown here in seven to ten years.

The tree makes its best growth in well drained, deep clay lowland soil, but in the foothills it does well on land unfit for cultivation. As many ranches extend up into the foothills, a few acres could be spared for the growing of locust. On the ranch of but a few acres a quarter of an acre grove of locust would be ample to keep the ranch supplied with posts and fuel and at the same time would serve as a shelter to the ranch buildings. The propagation of locust is so simple that a plantation can be established by any one. The seed may be gathered locally or purchased from dealers for 25 to 60 cents per pound. Just before planting the seeds should be soaked for several hours in water at a temperature of 150 degrees to 160 degrees Fahrenheit, which will cause part of them to swell. These should be sorted out with a sieve. Have a mesh of proper size to allow the seeds not swollen to pass through and the rest should be soaked again, repeating the operation until all are swollen. Planting should immediately follow the soaking of the seeds, as under no consideration should they be allowed to dry out. Early spring planting is in general advisable, although the seed can be sown as soon as it matures, when it will generally come up and make a considerable growth the first season. The seed should be sown in seedbeds of well pulverized, rich loamy soil in early spring. If hand cultivation is to be given, it may be sown in drills 12 to 15 inches apart in a bed, but if horse cultivation is to be practiced, rows 2 to 3½ feet apart will give the best results. The seed should not be covered more than one half to three fourths of an inch deep, and should be kept uniformly moist during germination. A pound contains about 28,000 seeds, and is sufficient for

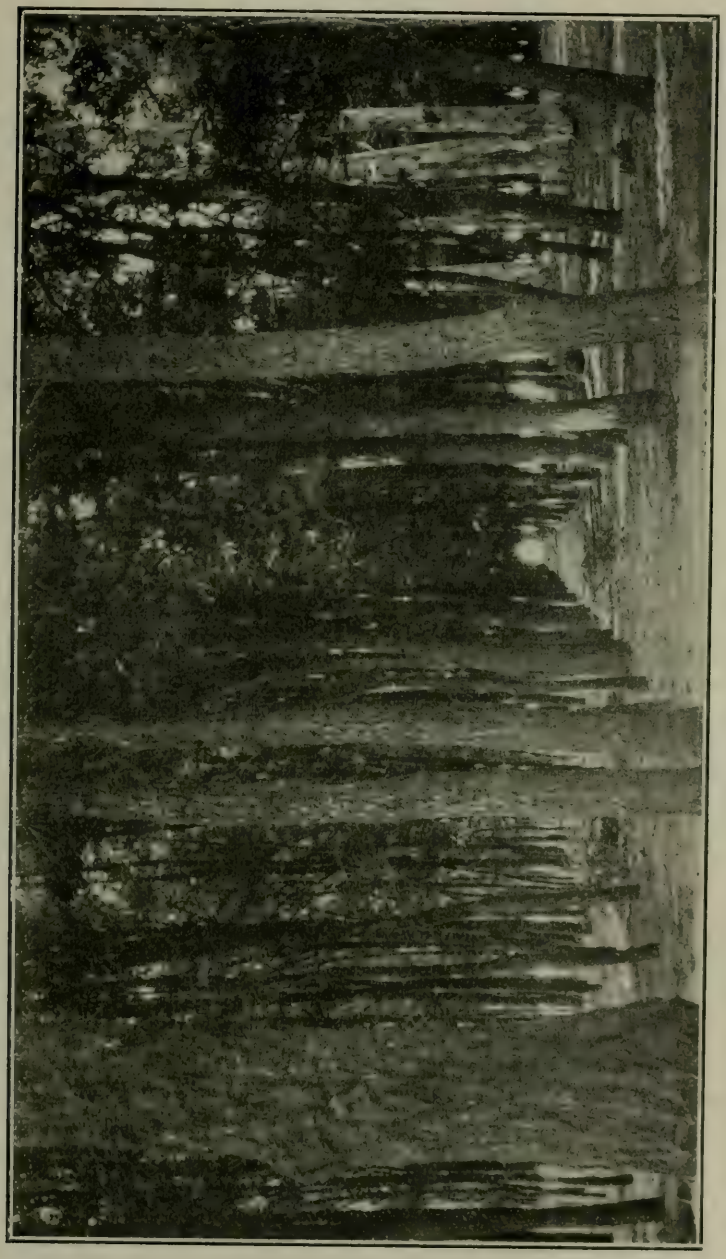
a row 900 feet long. The seedlings will be large enough to set out in their permanent sites the following spring after planting, at which time



Black Locust.
A 20-year-old black locust plantation in the upper San Joaquin Valley. The stand averages 60 feet in height and furnishes a source for fence posts.

they should have attained a height of 1½ to 2 feet. If purchased from nurserymen the price of seedlings varies from $2 to $7 per 1,000.

The method of management adopted in a plantation of locust largely determines its usefulness and value. Thick planting should be the rule



Black Locust.

Interior of same grove. Trees planted 8 by 8 feet apart. Plantation never thinned, resulting in long, clear trunks, but same diameter, varying from 6 to 20 inches.

in order to force the tree into straight, tall growth. In many cases 4 by 4, or 3 by 6 feet, are suitable distances for producing fence post

timbers. The best success usually results when the locust is grown mixed with some low-growing, heavy foliaged tree, as its own shade is not dense enough to keep out grass and weeds.

The Osage orange, Russian mulberry, box elder, hardy catalpa, and white elm are good associates, as they cast a heavy shade and do not grow rapidly enough to overtop the locust. The locust is a good tree to plant with the black walnut where the latter is desired as the permanent stand. The two may be planted alternately in the rows. Within fifteen years the locust may be cut for use as fence posts, leaving black walnut for the final stand. (Extract from The Locust Planting Leaflet—U. S. F. S.)

Another phase in the production of locust is in its use as shipknees and treenails, there still being such a demand in spite of the use of steel in ship construction. On a ranch in Napa County, locust was planted along the drive leading in from the county road. On one third of a mile of this road four rows of locust were planted, two rows on each side. These outside rows are now forty years old, average about 24 inches in diameter, and are 60 to 65 feet high with the boles clear for 20 feet. A Mr. Baxley, a hardwood dealer of Berkeley, offered the owner $1,000 for 102 of these trees. The following is an extract from a letter from Mr. Baxley in regard to the use of locust for treenails: "I have shipped it (locust) to San Francisco to be sawed into treenails, having shipped sometimes as much as 40 car loads in six months for that purpose. We compete with the Eastern treenails and I believe the California locust is generally considered better. Trees forty years old are sometimes 40 inches in diameter at the stump. It is also worked into rollers, mallets, etc. As far as I know the bulk of all that is used here is made into treenails. I pay from $10 to $15 per cord, cut at my expense, allowing $3\frac{1}{3}$ tons (green) to the cord." There will always be such a demand, and though large plantations with this object in view should not be too strongly recommended, planting along roads, both public and private, is desirable.

The rancher who plants a row of locust along his field bordering on the public road, not only performs a useful public service in giving shade to the road, but he also does something that may one day prove to have been a good investment. Such planting may be done where the main object is the production of posts, in which case the trees, or at least every other one, should be cut at the end of ten or fifteen years. Then when the sprouts are about a year old they should be thinned back to two or three per stump. Posts are grown in this way in the East very successfully, and with but little damage to the crop that is growing in the field—the crowns of the trees are so light and open that the shade is not very dense and the roots are not exhaustive to the soil. In all cases cultivation during the first two or three years is necessary for the best development of the plantation.

Green Ash.

In default of better timber, green ash when well seasoned makes a fairly durable post timber. Planted in timber cultures in the plains states, the tree shows exceptional capacity for drought endurance. Green ash has been planted in California only as a street shade tree in the San Bernardino Valley. Here trees grow thriftily under conditions of great atmospheric dryness, but wherever planted they have had the benefit of abundant soil moisture. The drought hardiness of the tree in other interior valleys has not been tested. Green ash is a tree of more rapid growth, but probably of no greater drought resistance than the black locust. It is unlikely that it will prove suitable for planting upon dry uplands unfavorable for the growth of the locust.

Honey Locust.

Honey locust furnishes a good post timber and is a species of great drought resistance. It has been grown successfully without irrigation in timber culture on dry uplands in Modoc County, and it is suitable for planting in the interior valleys. The tree is hardly superior to black locust in drought resistance, however, and it grows slowly in diameter. For this reason it will generally be inadvisable to plant honey locust for post timber.

Black Walnut.

The Eastern black walnut furnishes a durable post timber, and it is sometimes planted in the Middle West for post production. It has not been grown for this purpose in California, but has been frequently planted as a shade tree. It is not well suited by the deficient soil moisture in most parts of the interior valleys, however, and makes slow growth. The possibility of growing black locust through a much wider range in the California valleys than the walnut makes the planting of the latter tree for post timber inadvisable.

The California walnut, native of the dry hills and uplands of southern California, is in that section a stunted and shrubby tree. It has been introduced in the upper Sacramento Valley, and when planted under the more favorable conditions in this locality it reaches much better development, uniformly surpassing the rate of growth and the proportions attained in California by the Eastern walnut. The native tree is adapted to endure severe drought, and should be planted instead of the Eastern species where walnut is to be grown for posts production in the interior valleys.

Chestnut.

Eastern chestnut furnishes a post and pole timber of great durability in contact with the soil, but the range of the tree for commercial plant-

ing is limited even in eastern states. Chestnut requires abundant soil moisture for its best development. It has been planted occasionally in various parts of the California valleys, but it is unsuited to endure drought, and is somewhat stunted in height by the dry heat in the interior. For this reason chestnut planting in the valleys for post production is inadvisable. Climatic conditions are more suitable for the growth of the tree on the western slopes of the coast ranges or at middle altitudes in the Sierras. It is probable that chestnut will grow thriftily if planted on cut-over redwood lands.

Osage Orange.

Osage orange furnishes a good post timber, and is capable of growing successfully in dry situations. Occasional trees are found growing thriftily throughout the California valleys. However, the use of the tree for post planting is inadvisable, since it is of a slow growth and has a strong tendency to crooked and branchy development.

Mulberry.

Russian mulberry furnishes a timber suitable for fence posts, and has been planted to some extent for this purpose in the Middle Western States. It is adapted to dry situations, and has grown well in several localities in the interior valleys of California. Since more suitable trees may be selected, its slow growth and its tendency to irregular form makes it unsuitable for post planting.

Catalpa.

Catalpa has gained a reputation for very rapid growth and its timber for great durability. This has led to the starting of several extensive catalpa plantations in some of the Middle Western States for the production of post timber. Several species of catalpa have been occasionally planted for shade or ornament throughout the valleys of California, and in the San Joaquin Valley small experimental post plantations have been set out. However, the catalpas need abundant moisture for their development, and grow best on well watered bottom lands. Deficient soil moisture and the long dry season in summer months render nearly all parts of the California valleys unfavorable for the growth of these trees.

Redwood.

Redwood has been planted for ornament and grows thriftily in the California valleys. It does not grow with sufficient rapidity, however, to make planting for post timber advisable.

Incense Cedar.

Posts cut from incense cedar growing throughout the Sierras are used to some extent in California. The cedar has grown thriftily when planted in the valleys, but it is a comparatively slow-growing tree, and on this account is unsuitable for valley planting for post timber.

Tie Timber Planting.

Forest planting has been undertaken in several sections of the country to meet future demands for tie timber. Planting for this purpose has been confined to areas of waste land, however, and in the California valleys the planting of trees in general use for tie timber is inadvisable. The competition that plantation-grown timbers must meet with softwood timbers lumbered in California or shipped from the forests of Washington and Oregon would make tie plantations of most trees unprofitable. Black locust thrives in California and grows more rapidly than other trees which furnish suitable tie timber. However, its wood is of greater value for other uses and the planting of the tree for tie timber can not be recommended. Catalpa and chestnut, frequently recommended for tie timber planting, do not grow successfully in the California valleys. Certain eucalypts, which furnish tie timbers of great durability in Australia, grow successfully in California. Should eucalyptus timber come into use for ties, the planting of these trees alone, on account of their rapid growth, may be recommended for tie production in California.

Piling and Pole Planting.

Douglas fir, yellow and Oregon cedar, and redwood are used for poles and piling on the Pacific coast. These trees have all grown successfully in the California valleys. When planted thus away from their native range in the mountains, however, they endure conditions unsuitable for their rapid development, and their planting for timber production is inadvisable. Chestnut timber is used to a considerable extent for poles for electric wiring in Eastern States, but the tree is not suitable for forest planting for pole production in the California valleys. Eucalyptus timber is the most valuable wood on the Pacific coast for piling and many species furnish suitable pole timbers. The eucalypts are the only trees which may be recommended for planting for poles and piling in California.

Timber Planting.

The abundant and accessible supplies of softwood timber on the Pacific coast will prevent the valley planting of coniferous trees for timber production in California. Market conditions are not favorable for the planting of any of the native coniferous species in the valleys, as the

white pine is planted in the New England States, to grow box-board material or softwood saw timber.

Heavily timbered with coniferous forests, however, the Pacific Coast States are lacking in native hardwood timber. None of the hardwoods native to this section are esteemed for their timber, and supplies of hickory, oak, and ash are imported from Eastern States to meet the demand for this class of material. These trees have all been grown in the California valleys, but their growth is too slow to make timber plantations profitable, and the rapid growing eucalypts have been found to furnish a hardwood timber equal to hickory, oak, and ash in strength and other qualities and capable of substitution for these woods.

The competition with the timber which rapid growing gum plantations yield will undoubtedly discourage the planting of other trees in the valleys for commercial timber productions. Exception may be made in the case of the black locust. Plantation-grown timber of this species has come into use for a variety of purposes, but the tree has been planted upon so limited a scale that the demand for the wood can not be adequately supplied. When obtainable, locust timber is manufactured and used on a considerable scale for shipknees, treenails, insulator pins, implement stock, etc. More extensive commercial planting of locust to supply timber for these uses is advisable. The wood of the wattles or acacias, is strong, and it is used as a cabinet wood and for a variety of other purposes in Australia and South Africa. These trees grow very rapidly and they have been considerably recommended for commercial planting in California. They have not as yet been planted to raise timber.

Tanbark Planting.

Large tanneries are located in California, and their demand for tanbark is mainly supplied by the bark of the tan oak growing throughout the Coast Range Mountains in the northern portion of the State. Many oaks are native of California, but the bark of other species is of little or no value for tanning purposes. Tan oak bark is of peculiar excellence for tanning, and is greatly preferred by California tanners. It commands the highest prices obtained for tanbarks in any part of the country. The annual consumption of tan oak bark in California is high, but the natural supplies of the timber have always been adequate to meet the demand. With annual shrinkage in the available supplies, however, the price of bark has risen continually. Users have attempted to substitute other tanning materials for tan oak, but very little effort has been made to insure a second crop of bark upon areas over which it has been peeled, or to protect second growth stands from injury from fire. In view of the decreasing accessible supplies of tanbark, attention is drawn

to the feasibility of sustaining the yield of this product in California to avoid the necessity for importation in future.

Tan Oak.

Tan oak has been planted ornamentally in several localities in the Sacramento Valley and planted trees have made very thrifty growth. The tree reaches its best development in the humid climate in the Coast Range Mountains, however, and is of slower growth when planted out of its natural range. It is inadvisable to plant it for tanbark production in the interior valleys. The tan oak is not a tree of rapid growth and the heavy bark of old trees is most esteemed for tanning. Valley plantations would grow too slowly to be profitable. In addition, plantation-grown bark would have to compete with virgin supplies and with the production of rapid growing second growth stands. The yield of unprotected sprout growth areas is uncertain, owing to injury liable from fires running in the débris from the bark peeling. However, second cuttings for bark have been made after twenty-five to forty years from sprout growth in old bark peelings, and the management and fire protection of sprout stands of tan oak should prove profitable.

The planting of the tan oak for bark production in the Coast Range Mountains is worth consideration. In this section areas of cheap land suited for the growth of the tree are numerous. Peeled tanbark areas have frequently grown up densely with brush, and with a thin stand only of sprout trees. On such areas the planting of either acorns or seedling trees under the open second-growth stands would be a practical measure to increase the density and the yield. The tan oak is extremely tolerant and grows up readily under shade. The best tanbark, highest in tanning content, comes from the southern portion of the range of the tree in the warmer Santa Cruz and Santa Lucia mountains. The location of bark plantations in this section would be advisable.

Acacias.

Should planting for tanbark production be considered by California planters it is probable that the rapid growth and quick yield of the acacias or wattles introduced from Australia will make them more suitable for planting than the tanbark oak. The bark of the wattles is of high value for tanning purposes, and the native wattle forests are the chief source of tanbark supply in Australia. In recent years extensive plantations of these trees, set out exclusively for tanbark production, have proved highly profitable in the South African colonies.

In Australia, the black, golden, and silver wattles are the acacias chiefly valued for tanbark, the golden wattle being the greatest tannin producer, while in South Africa the silver or black wattle alone is planted for this purpose. A great variety of acacias, including all those

most valuable for tanbark, have been successfully grown in California for many years. Tests of the bark of trees grown in California have been made to determine their value for tanning and the practicability of planting for tanbark supply. The results of chemical tests* in which the average tannin per cent in California bark as compared with the best results obtained from Australian tanbarks is given below. The percentage given is the absolute tannin per cent in the dried bark. It is shown that California bark is much superior to the Australian product in tannin content.

Golden wattle	California bark	46.09 per cent
	Australian bark	42.10 per cent
Silver wattle	California bark	49.76 per cent
	Australian bark	36.30 per cent
Black wattle	California bark	45.83 per cent
	Australian bark	32.33 per cent

A still more practical test of California wattle bark in comparison with bark of the tan oak has been made by using it in the ordinary process of commercial tanning. The results of these tests convinced experienced tanners who conducted the experiments that wattle tanbarks were superior to the best California oak barks. The wattle bark was not ground as is customary with oak bark, and the results are, therefore, not as good as may be expected.

	Pounds bark.	Pounds tanned leather.
Best Santa Cruz tan oak	100 (ground)	80
Silver wattle	100 (unground)	112
Black wattle	100 (unground)	106
Golden wattle	100 (unground)	96

Acacias are native to a subtropical climate and will not tolerate low temperatures. The young trees are as frost tender as eucalypts, and the possibility of wattle planting in different sections of California is determined by the amount of cold that the young trees must withstand. Few species will endure temperatures lower than 20 degrees Fahrenheit, but they have been successfully planted in all the warmer valleys of California. They find the heat and drought in the interior unfavorable for their best development, however, and grow most successfully in the coast region in the valleys opening from the coast.

Wattles have been recommended in California for planting upon waste lands, dry uplands, and in the dry Sierra and Coast Range foothills. They grow successfully upon waste lands and upon sand lands along the coast, but they are not suited for commercial planting in dry foothills or in the semiarid interior valleys. In such situations they are stunted and of inferior development. Wattles are suited for valley planting and they have also been grown upon cut-over redwood lands. In the redwood belt they may be planted on denuded tan oak areas, but

*Report of Agricultural Experiment Stations, University of California, 1898-1901.

out of this section they may not be grown upon cut-over mountain forest lands.

The golden, silver, and black wattles may all be grown for tanbark in the California valleys. Silver wattle is the most hardy of these species. It withstands temperatures as low as 16 degrees Fahrenheit. Black and golden wattles are less hardy, however, and are injured by temperatures of 20 degrees.

Wattles are of very rapid growth. In Australia they are cut for bark after five to six years' growth, while the Natal plantations in South Africa are cut every ten years. The bark from which the tests of California grown bark were obtained was peeled from trees about eight years old. The bark of the wattles is thin, but contains a high per cent of tannin. That from the branches is inferior to bark upon the trunk of the tree. The probable yield of bark from plantations in California may not be estimated, but five to six tons per acre is obtained after ten years' growth from the plantations in Natal. Plantations of large acreage will be needed to meet in any degree the annual demands for tanbark in California should the wattles gain a place in the tanbark market.

Osier Planting.

Osier holts have not been established in California for the production of willow basket ware, but it seems probable that such an enterprise would be very profitable. The extensive areas of overflowed marsh land in the bay counties in close proximity to good markets in San Francisco and vicinity gives opportunity for the development of an extensive basket willow industry in this section. The possibility of flooding land under culture for basket willows creates a most favorable condition for their growth. Osier holts should be located above the inflow of brackish tidewater, but numerous suitable areas might be found in the level tule marshes near the junction of the San Joaquin and Sacramento rivers.

Cork Oak (Quercus suber).

The Spanish cork oak is a native tree of southern Europe and the north coast of Africa. This comparatively small area produces and supplies the world with the cork of commerce, creating a large income to the countries engaged in the culture. In the United States alone about $4,000,000 worth of cork is annually imported, and because of the extensive use of cork for making linoleum, Spanish black, bottle corks, life preservers, etc., and because there is no substitute which can be used, the industry is an important one. It has been found that the cork oak does very well in the foothills and valleys of California and a few experimental plantations have been established, and it is quite probable that the cork industry will some day become of much importance in California.

Aside from its commercial value, the cork oak is a beautiful tree for decorative planting and shade, and has been planted for this purpose in a few places throughout the State.

As a special circular is being prepared for distribution by this office, I will not take up the study of this interesting tree in detail here, but will make only a few general remarks about its characteristics.

The Spanish cork oak is a small evergreen oak rarely over 30 or 40 feet high with a diameter of about 2 feet. Under favorable conditions, however, it sometimes reaches a height of 60 feet with a diameter of 4 feet. It reaches a great age, living to be 300 to 400 years old. The tree has an even round-shaped crown, resembling the olive tree somewhat in color, which, being evergreen, makes it a valuable tree for ornamental purposes.

Throughout the California valleys where the cork oak has been planted it has done well and has made good growth.

It attains its largest size in deep, rather moist loam, underlaid with granite or porphyry, but flourishes in all soils except those composed of limestone or heavy clay, and reaches good dimensions in sand if its roots are able to reach a loose subsoil. In its natural range it is found on broken, unproductive land, and seems to grow best on low hills, rarely ascending more than 2,000 feet above the sea, though in some of the ranges of Algeria it grows well as high as 4,000 feet.

In 1860 seeds of the cork oak were planted in California, and the resulting trees have done exceedingly well, reaching a diameter of 21 inches and a height of 40 to 50 feet.

Further information relating to the cork oak and the cork industry will soon appear in a leaflet devoted to the subject and published by this office for the public.

Shade and Ornamental Planting.

Although there has been little commercial planting of other trees than the eucalypts in California, a great variety of species is planted for shade and ornament. The street planting is an attractive feature in the towns in nearly all sections of the valleys. The abundance of tree growth within the boundaries of the towns is frequently in strong contrast to the wide sweep of level country destitute of tree growth which surrounds them.

From a desire to maintain throughout the year a pleasing semitropical luxuriance of bloom and foliage, evergreen, broad-leaved trees are most esteemed in southern California for street and ornamental planting. Deciduous hardwoods of attractive appearance, which are superior to most evergreens for shade, are in disfavor. In the northern valleys less attention is paid to the selection of evergreens, and deciduous hardwood trees native to the Eastern States are chiefly used for street planting.

A list of the species planted for shade and ornament in California would include nearly all the deciduous hardwoods planted throughout the country. Although it has become customary to plant certain species, variety has been chiefly sought. The optimistic trial of new species has led to the use of some which have proved very inferior. It is the purpose of this section of this report to point out the best species for street and ornamental planting. Shade trees should be selected for permanence, and slower growing species are generally preferable to trees of very rapid development. Trees are also recommended for their value as shade trees, and for their hardiness and endurance of drought in the interior valleys.

Evergreen Hardwood Trees.

Many evergreen hardwood trees are very suitable for ornamental planting, but few develop into good shade trees suitable for street planting.

Pepper Trees.

The pepper tree has been extensively planted in California for shade about residences and along streets and avenues. It is a rather low shade tree, but the rapid growth, graceful form, and attractive drooping foliage make it very suitable for planting for shade and ornament. The contrast of the dark foliage with the abundant sprays of bright berries through the summer and fall give the tree a very pleasing appearance.

This exotic is native to a warm climate and will not succeed where severe frost and cold are encountered. However, it has been grown throughout nearly all the valleys of the State and may be planted in a great variety of situations. It is capable of enduring considerable drought. Trees frequently grow up from natural seeding upon the coarse river-wash areas of old stream beds in southern California where other trees are unable to grow. Trees have also grown thriftily without care or irrigation when planted on high uplands in southern California and in the arid mountain foothills.

Pepper is one of the best species for planting along country roads through the treeless valleys, and its capacity for drought resistance will permit its use for this purpose in even the drier interior valleys.

Acacias.

The acacias or wattles are trees of rapid growth, evergreen foliage, and attractive appearance. They have been considerably planted in California, especially in the southern counties, for shade about residences and along streets. But the wattles are comparatively short-lived. Twenty years has proved to be the life period of many species in California, and the necessity of replacing the trees has brought the acacias

into some disfavor for park and street planting. Their rapid growth makes them very useful for this purpose, however, despite their shortness of life.

The spreading form and low habit of growth of several species (*A. bayleyana, decurrens, floribunda, mollissima,* and *pycnantha*) make them more suitable for shade or parks than for street planting. The blackwood is the acacia most extensively used for the latter purpose. It retains its branches low on the stem, but is less spreading in its habit of growth than other species. Its straight, symmetrical form and abundant foliage make it an attractive species for street planting. It is shallow-rooting, however, and trees are frequently wind-thrown in severe storms. On this account it is unsuitable for street planting in some sections of the valleys.

Live Oak.

The valley live oak, growing naturally in the interior valleys, is occasionally planted in the valley towns. It is a handsome ornamental tree suitable for both street and park planting. Young trees have compact rounded crowns of dense foliage, while older trees are more spreading and shady. The growth of planted trees is sufficiently rapid to recommend this species for street planting.

Silk Oak.

Silk oak has been held in great favor in southern California for street and avenue planting. Despite its evergreen foliage and rapid growth, it is an inferior street or shade tree, and can be little recommended for ornamental planting. During its youth the tree has fairly dense foliage. In later years, however, it loses its symmetrical habit of growth and the crown becomes thin and open. The continual falling of the leaves is also detrimental to the planting of this species as a street tree.

Other Trees.

Other evergreen broad-leaved trees suitable for ornamental planting in California include many exotics introduced from subtropical regions. Nearly all species are intolerant of frost, but they attain fine development in the moderate climate of most of the California valleys. They are not adapted to grow without abundant soil moisture, and are best suited for park or lawn planting, although some species are frequently planted for shade along streets and avenues.

Several species of *Casaurina* and *Aruacaria* are esteemed for ornamental planting. The rubber tree grows to very large proportions in the valleys, and makes an exceptionally good shade tree. *Jacaranda* and *Pittosporum* are frequently used for park planting, and are suitable for street planting where trees of low development are desired. Palms and

magnolias are extensively used for avenue planting. The magnolias are very ornamental for this purpose, but do not thrive without abundant soil moisture.

The flame tree, or *Sterculia,* is frequently set out in street rows in southern California. The tree is of rapid growth, but it does not develop into a shade tree, and is most suitable for ornamental planting. The tree requires abundant soil moisture. It becomes thin-foliaged with later growth, and the breakage of branches frequently spoils the symmetry of the tree.

Camphor tree has been planted for ornament in parks and along streets in many towns in the northern and southern valleys. It is not adapted to arid conditions, and is somewhat stunted in height in southern California. Moisture conditions are more favorable in the northern Sacramento Valley, and the tree reaches its best development there. Camphor is evergreen, and the abundant glossy foliage gives the tree an attractive appearance. It makes a spreading ornamental shade tree, but it is more suitable for lawn and park planting than as a street tree. Large spreading trees 60 to 70 feet tall are growing in favorable situations in the Sacramento Valley.

Conifers.

Conifers grow tall and slender and make poor shade trees. They are also not attractive for street planting. They are most suitable for ornamental planting in parks and along avenues.

Pines.

Several species of pines have been planted to a limited extent for ornament in parks and along streets and avenues. With the exception of the Monterey pine, they have not been chosen for protective planting, but the successful growth of several species in the valleys shows that they may be used for this purpose.

Monterey pine is the conifer most extensively planted in the valleys. The tree reaches 80 to 100 feet height in favorable situations, and its handsome appearance and rapid growth made it at one time a favorite for ornamental planting. The early decadence of the tree and the necessity for replacement have brought it into disfavor for this purpose. Very few planted trees thirty to thirty-five years of age are growing even in southern California where the tree has been most extensively planted. However, Monterey pine has considerable capacity for drought endurance and may be grown in the dry interior valleys. Where longevity is not essential, the short life of the tree should not discourage its planting.

Coulter and digger pines are occasionally planted in lawns and parks. Both trees are of great drought endurance and grow thriftily to large

size in the interior valleys. The digger pine becomes straggly and open-foliaged and unattractive for park planting after its early growth. The bushy habit of growth of the Coulter pine renders the tree suitable for ornamental planting.

Yellow pine grows naturally at middle altitudes in the mountains, but planted trees have grown thriftily to large size at low elevations in the interior valleys.

Sugar pine has been set out in a few localities in the valleys in northern California, but it is unsuited for valley planting. The tree is native to the cool, humid climate of the mountains, and does not thrive when planted in the dry valleys at low elevations.

Torrey pine is occasionally planted in parks, and its capacity for drought resistance permits its successful growth in even the drier interior valleys. The slender form and thin foliage make the tree unattractive except where variety is desired in planting.

Red pine introduced from the Lake States has been planted in the northern Sacramento Valley. Trees have made thrifty growth and rapid development.

Scotch and Austrian pine have both been planted in several localities in the valleys. They show a capacity for considerable drought endurance, but do not make rapid growth in the interior valleys. The spreading form and bushy foliage of the trees make them attractive for park planting.

Italian pine has been planted in parks and along streets in a few cities in the northern valleys, and the tree may be highly recommended in place of the short-lived Monterey pine for ornamental planting. It develops a spreading, round crown of dense foliage, almost unique among pines. It makes quite rapid development and in thirty years' growth in the interior valleys the tree shows no tendency to short life or decadence. The trees in the Capitol Park at Sacramento are notable examples of the growth of Italian pine in California.

Jerusalem and Canary pine, introduced from southern Europe, have been planted for ornament to some extent in lawns and parks in California. They are drought resisting trees and grow thriftily in the interior valleys. Jerusalem pine is straggly in its habit of growth and not especially attractive in appearance. Canary pine is slender in habit, but its abundant dark foliage and rapid growth render it a much more suitable tree for ornamental planting.

Sequoias.

Out of the sentiment and interest in the giant Sequoia groves in the Sierra and Coast Range mountains, both the big tree and the redwood have been planted for ornament in valley towns throughout the greater part of the State.

Redwood has been planted very frequently as a park or ornamental tree. Although native to the humid coast region of the State, it grows very thriftily in the interior valleys, even in southern California. Many trees have in thirty years' growth reached a height of 100 feet and diameter of 3 to 4 feet. The redwoods in the Capitol Park at Sacramento are probably the oldest planted trees of this species in the State, and they furnish notable examples of the rapid growth of the tree in the interior valleys. Here and in other localities in the Sacramento and Santa Clara valleys redwood apparently makes as rapid development as in its native range along the coast.

When open-grown, redwood is not stimulated to rapid height growth, but it presents a most attractive appearance as an ornamental tree. It develops a stout, rapidly tapering bole with a slender, symmetrical crown and abundant foliage, retaining branches low on the trunk. The tree shows no tendency to become thin-foliaged and unthrifty with later growth when planted in the valleys. Redwood is a most suitable tree for planting along drives and avenues. The bushy development of the tree and its thrift in the northern valleys suggest it as equal to the Monterey cypress for wind-break planting.

The big tree does not grow as successfully in the valleys as the redwood. The big tree groves occupy situations in the Sierras where moisture conditions are especially favorable, and the trees rarely range below an altitude of 5,000 feet. When planted in the valleys at low elevations this species is unfavorably affected by the climate conditions during summer months.

Big tree has been quite frequently planted for ornament, and the regular pyramidal form and handsome compact foliage make the young trees attractive for this purpose, but older trees generally become very ragged and thin-foliaged. In the valleys trees rarely reach a height of more than 40 to 50 feet in thirty years' growth, and are stunted by the heat and drought even when planted where soil moisture is abundant.

Deodar.

The deodar, introduced into California from India, has been planted to some extent for ornament in lawns and parks and in a few instances along avenues. It has been planted chiefly in southern California and to a less extent in the northern valleys. Deodar is very drought resisting, and has grown thriftily without irrigation in many localities in the interior valleys. Its slow growth renders it inferior for protective planting to the cypress, but the low persisting branches and graceful habit of growth make it a most suitable tree for ornamental planting in parks.

Incense Cedar.

Incense cedar has frequently been planted for ornament in the valleys throughout the greater part of the State. The tree is very drought

resisting and planted trees have grown thriftily to large size in the valleys. The rate of growth is apparently as rapid in the interior valleys as in the native range of the trees in the mountains, and planted trees do not become thin-foliaged in their later growth. The low branching and the compact symmetrical form of the tree make the incense cedar a suitable tree for ornamental planting in parks and along avenues.

Douglas Fir.

Douglas fir trees planted in parks in several cities in the Santa Clara and Sacramento valleys have grown to large size. They grow rather slowly but the thrift of the tree is apparently unaffected by the heat and drought in the valleys. However, a humid climate furnishes conditions most favorable for the growth of the Douglas fir, and it is out of its range in the dry California valleys. The characteristics of form and habit of growth of the tree do not make it attractive for street or ornamental planting, and it can not be recommended for this purpose.

Other Species.

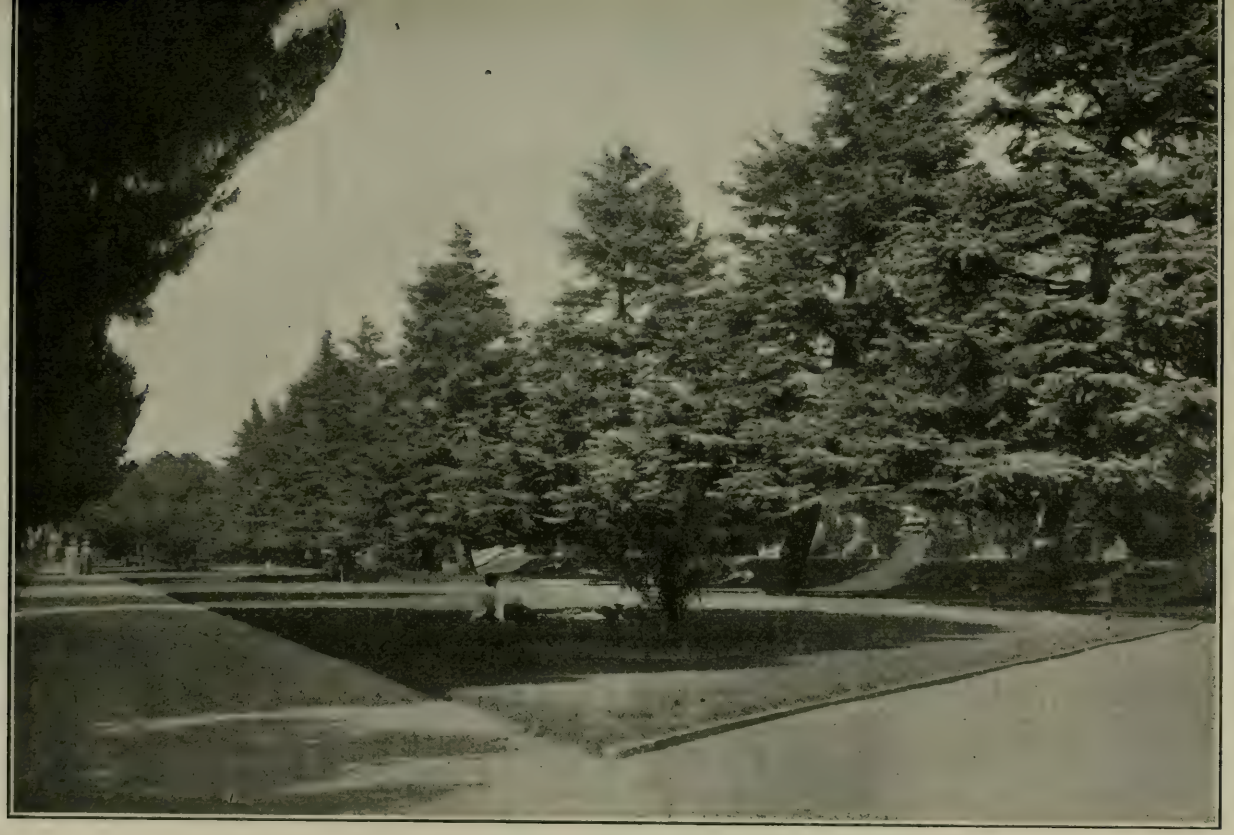
Several other coniferous trees have been planted on a very limited scale in parks in different sections of the valleys. The number includes Norway and blue spruce, foxtail and Bishop pine, Parry piñon, several junipers and cedars, and the Lawson cypress. Most of these species are of slow growth and are somewhat stunted where planted in the dry valleys. They are generally inferior to other coniferous trees mentioned for ornamental planting. The Japanese *Cryptomeria* is a good ornamental tree, and has grown to large size in parks in several cities.

Deciduous Trees.

A number of deciduous hardwood trees have proved especially hardy planted in the interior valleys, and develop into fine ornamental shade trees. They should be selected for street planting in preference to other species. The best species are the cork elm, ailanthus, black walnut, green ash, black and honey locust, and umbrella tree, although several other species which have been but little used are also suitable for this purpose. Some trees, which have been used for street planting, are not adapted to endure the valley climate in California and are unsuitable for future planting.

Cork Elm.

Cork elm has been extensively planted for shade in parks and along streets in towns in the northern valleys. Although deciduous, it is one of the best species used in the State for this purpose. The tree makes rapid growth in height and diameter, and develops a stout bole with



Deodar as an Ornamental Tree.

Trees in this row, planted in the Capitol Park at Sacramento, are among the oldest deodars in the State. These trees are about 30 years old and from 40 to 45 feet tall.

wide spreading branches and a rounded, dense foliaged crown. Cork elm apparently finds conditions very suitable for its growth in the Sacramento Valley and reaches fine development. It has much the appearance of the white elm when it has reached the height of 60 to 80 feet, and it should always be planted in preference to that species in California.

White Elm.

White elm has been planted for shade and ornament along streets and country roads throughout nearly all the valleys of the State. The tree has not grown well in California, however, apparently finding the heat and drought in summer unfavorable for its best development. It grows quite slowly even when planted in parks where soil moisture is adequate, and in the interior valleys trees frequently become stunted and thin-foliaged when grown without irrigation. White elm is in every way inferior to cork oak for planting in California, and it can not be recommended for future use.

Green Ash.

Green ash has been planted in several towns in southern California as a street shade tree. Its rapid growth, spreading developments, and dense foliage render it one of the most valuable deciduous species for this purpose. The tree is of attractive appearance, and since it grows thriftily in the dry interior valleys it is a species most highly to be recommended for extensive use as a street shade tree.

White Ash.

White ash has been planted in parks and along streets in a number of towns in the interior valleys. The trees have grown very slowly and apparently do not thrive under the conditions of heat and drought encountered in summer months. The tree can not be recommended for either street or shade planting.

Black Locust.

Black locust has been widely planted for ornament and for shade about ranches and along streets in both valley and foothill towns throughout the State. Since it may be grown without care or irrigation in very dry situations, it is one of the best deciduous species for street planting in the interior valleys. It reaches its best development as a street tree in the northern Sacramento Valley, where it develops a tall, spreading form and makes rapid growth. In most sections of the valleys it is a low, spreading tree when open-grown, but the dense attractive foliage gives it a pleasing appearance for street planting.

Honey Locust.

Honey locust has been used to a limited extent in the valleys as a shade tree for street planting. Although the tree has an open crown and light foliage, it grows straight and tall with a spreading, graceful form, and is a useful tree for this purpose. It is capable of considerable drought endurance, and the possibility of growing it without irrigation in the interior valleys recommends it for more extensive planting as a street shade tree.

Ailanthus.

Ailanthus has been little planted in late years in California, but it was formerly favored for street planting and for shade about ranch buildings in the northern valleys. It has been planted to a limited extent in southern California. Fine spreading trees 100 feet high have grown in thirty years in some localities. It grows to large size in dry situations in the valleys and on dry uplands where the growth of even black locust is somewhat stunted. Ailanthus grows rapidly and makes a good shade tree. It is worthy of wider use for street planting in the interior valleys.

Walnuts.

Eastern black walnut has been planted to some extent along streets for shade in the northern valleys of California. The height and spreading development of the tree makes it very suitable for street planting, but it does not thrive in drier portions of the interior. The tree bears abundant crops of nuts in the valleys. The fine development of the native California walnut when planted in the northern part of the State has led to considerable use of it in this section as a shade tree for street planting. It grows more rapidly and reaches larger proportions than the Eastern walnut, and on account of its indifference to drought it is superior to this species for shade planting in the interior valleys.

Butternut.

Butternut has been planted in a few localities in the northern valleys for a street and park tree. It grows slowly and does not thrive in this section and appears unfavorably affected by the summer climate. It can not be recommended for either street or ornamental planting.

Boxelder.

Boxelder has been planted to a considerable extent for shade along streets and about ranches throughout the valleys, but it is very inferior for this purpose to many other trees mentioned. It grows best where soil moisture is abundant, and is not thrifty in dry situations in the interior. It is suitable for street planting where low and spreading

trees are desired, but its tendency to irregular form makes it an inferior species for this use. The wood is weak and the symmetry of the tree is frequently spoiled by the breaking of the limbs.

Maples.

Norway, sugar, red, and silver maples have all been planted to some extent in California for shade or ornament and grow thriftily in several sections of the valleys. The silver maple has been most frequently planted and is often used for a street shade tree. Street trees have often grown to large size. The maples need abundant moisture for their best development, and do not succeed in the interior valleys without irrigation. Where water may be supplied in this manner they are suitable species for street planting in all but the semiarid sections of the State.

Umbrella Tree.

The umbrella tree has been widely planted as a street shade tree throughout the valleys, and where low spreading trees are desirable it is a most useful species for street and ornamental planting. It grows quite rapidly with a compact, rounded crown of dark foliage. The abundant sprays of violet bloom in early summer heighten the attractive appearance of the tree.

Chinaberry.

Chinaberry is considerably planted along streets throughout the valleys. The foliage is dense and of attractive appearance, and like the umbrella tree, the chinaberry is useful for shade planting where low and spreading trees are not undesirable.

Hickory.

The hickories have been little planted in California, but several species thrive even in the interior valleys. Both the shagbark and the pignut hickory have grown to large size in several localities in the Sacramento Valley. The pecan has grown into fine large trees, also, in this section and along the coast in southern California. More arid sections of the valleys are not suited for the growth of these trees, but they may be planted through a wider range in the valleys than at present. The hickories are of rather slow growth, but they form tall, straight, spreading trees, and would be attractive species for street planting. Planted trees produce nuts in abundance in the hot interior valleys. It seems probable that cultivated varieties of the pecan might be grown like the English walnut for nut crops in favorable parts of the California valleys as they are in the Southern States.

Chestnut.

Chestnut does not reach its best development in the dry interior valleys of California, and when open-grown remains low and spreading. But its abundant foliage and spreading development make it a good shade tree, and it has been planted along streets to a limited extent for this purpose in the Sacramento Valley towns. Owing probably to the heat and drought, chestnut does not bear fruit in the California valleys.

Oaks.

The deciduous oaks have been little planted in California. Oaks grow rather slowly, but make handsome spreading trees for park or street planting. Occasional trees of several species, including English oak, bur oak, cork oak, and water oak, which have been planted in different sections of the valleys have grown thriftily to large size. They reach their best development in the more favorable climate of the northern valleys.

Catalpa.

Several species of catalpa have occasionally been planted for ornament throughout nearly all parts of the California valleys. Planted trees have grown into handsome ornamental trees in parks in some sections. Catalpa generally grows crooked and branchy, and its open, light-foliaged crown makes it a poor shade tree and unsuitable for street planting. When planted in the drier interior valleys, trees are generally stunted in height growth and do not thrive even when irrigated.

Other Species.

Several other deciduous species have been planted on a very limited scale in different parts of the California valleys. These trees include the white birch, basswood, liquid-ambar, tulip tree, tupelo, horse chestnut, oriental sycamore, red mulberry, weeping willow, and Paulownia. Most of these species have grown thriftily to large size and are suitable for ornamental planting. The basswood, tulip tree, and horse chestnut may be recommended for street planting in more favorable portions of the valleys.

EUCALYPTUS.

The introduction of the genera *Eucalyptus* into the State for ornament, shade, shelter belts, wind-breaks, and for fuel has long since passed the experimental stage. Owing to its adaptability to the soil and climatic conditions of most of the interior valleys and coast regions, and because of its rapid growth and the heavy, hard, strong quality of the wood, many companies have been formed for the purpose of growing it as a commercial venture. Planting operations have become so

extensive, and the proposition seeming feasible, the State Board of Forestry, in coöperation with the Forest Service, issued in 1908 Circular No. 2: A Handbook for Eucalyptus Planters. This circular dealt largely with planting operations, recommending the proper species to plant, and treating of the soil, moisture, and temperature requirements of each. Tables were also prepared showing the yield in board feet and in cords of the several plantations, but the figures were not presented in a very usuable form.

The University of California prepared a useful publication during the same year, being Bulletin No. 196, Eucalyptus in California.

During 1908 and 1909 new companies were formed continually until some eighty in all were doing business in California. Some of them sold stock and others planted areas ranging in price from $100 to $250 per acre. Quite a few have given up their projects. Unfortunately for the industry, two companies were obliged to discontinue business because of their fraudulent methods. Many of them are making claims for eucalyptus both in yield of timber and in financial returns which probably can not be realized. Because of such varying statements, and in many instances wild estimates of yield, a second and most thorough study of the best plantations in the State was made during the summer of 1910, to the end that investors might be protected against unscrupulous promoters and that legitimate companies might be afforded protection against temporary wild-cat schemes. That this data might have the approval of the Governor as well as the State Board of Forestry, the work was conducted in coöperation with the United States Forest Service. This arrangement afforded the further advantage of reducing expenses and eliminated duplication of work. The results are now completed and will be published as a bulletin. Every grove of any consequence was examined with the view of selecting for measurement those having made the best growth of different ages. Careful notes were taken, giving the age, species, spacing, largest diameter, greatest height, history of the management, kind of soil, location, number of trees of each diameter, and the total number on the area measured; this data was obtained for each grove and the results tabulated separately.

The following comparative table shows a summary of the results for all of the *Eucalyptus globulus* plantations worthy of consideration:

TABLE V. Summary of Yield from Blue Gum Plantations.

Seedling growth.

Name of grove.	Location.		Age.	Original spacing.	Present number of trees per acre.	Biggest diameter.	Greatest height.	Yield per acre.				Soil, water table, etc.
	Town.	County.						Total.	Total.	Total.	Unmerchantable tops.	
			Years.	*Feet.*	*Trees.*	*Inches.*	*Feet.*	*Cubic ft.*	*Cal. cds.**	*Bd. ft.†*	*Cal. cds.**	
Pratt Bros.	Escondido	San Diego	1⅓	8 x 8	636	3	25					Fine decomposed granite. Water table, 6 to 20 feet.
Wheeler	Callender	San Luis Ob'po	3½	10 x10	328	6	40	196.0				Loose sand. Water table, 100 feet.
Ontario	West Ontario	San Bernar'o	5	8 x 8	616	6	50	572.8				Sedimentary soil. Water table, 130 feet. Irrigated.
Thompson	Garden Grove	Orange	5	9 x 9	616	7	70	1,948.8	28.9	280	27.9	Loose loamy sand. Water table, 20 feet. Irrigated.
Jackson Park	Zaferia	Los Angeles	6	8 x 8	684	8	60	1,695.2	25.1	240	24.1	Light sandy loam. Hardpan. Water table, 17 feet.
Porter	Summerland	Santa Barbara	7	8 x 8	496	7	50	1,035.6	15.3	60	15.2	Sandy loam. Water table, 75 feet.
Sexton	Watts	Los Angeles	7	8 x 8	340	10	70	1,510.4	22.4	1,600	15.1	Hard sandy loam. Water table, 12 to 15 feet.
Diam'd Coal Co.	Watts	Los Angeles	7	8 x 8	560	10	90	2,245.4	33.2	2,370	24.1	Stiff sandy loam. Hardpan. Water table, 15 feet.
Hunter	Bairdstown	Los Angeles	8	6 x 8	844	8	80	2,947.6	43.6	1,280	39.2	Sandy loam. Water table, 12 feet.
Knapp	Garden Grove	Orange	8	6 x 8	888	8	70	2,354.0	34.9	1,160	30.7	Stiff sandy loam. Water table, 10 to 12 feet.
Courreges	Talbert	Los Angeles	8	6½x 6½	728	10	80	3,322.0	49.2	5,160	28.5	Fine silt, mixed with loam. Water table at surface.
Meechan (Fritsch)	Live Oaks	Sonoma	9	12 x12	344	12	110	5,334.4	79.0	13,100	27.7	Fine light sand. Water table, 10 to 15 feet.
Gordon	Strawb'ry Park	Los Angeles	10	10 x10	430	10	80	1,410.8	20.9	1,620	14.5	Sandy loam, mixed with clay. Hardpan. Water table, 80 feet.
Howland	Sunnyside	Los Angeles	10-12	8 x 8	660	7	70	1,044.8	15.2	80	15.5	Hard sandy loam. Hardpan. Water table, 20 feet.

*A California cord is equal to ¾ of a Standard cord.

†The total expressed in board feet is not in addition to the total stated in cubic feet and in cords, but is another way of expressing the same total.

TABLE V. Summary of Yield from Blue Gum Plantations.—*Continued.*

Seedling growth.

Name of grove.	Location. Town.	Location. County.	Age	Original spacing	Present number of trees per acre.	Biggest diameter.	Greatest height.	Yield per acre. Total.	Yield per acre. Total.	Yield per acre. Total.	Yield per acre. Unmerchantable tops.	Soil, water table, etc.
			Years	*Feet.*	*Trees.*	*Inches.*	*Feet.*	*Cubic ft.*	*Cal cds.**	*Bd ft.†*	*Cal. cds.**	
Meechan (Fritsch)	Live Oaks	Sonoma	12	12 x 12	336	12	120	5,939.6	88.0	16,660	25.7	Fine light sand. Water table, 10 to 15 feet.
Clark	San Mateo	San Mateo	15	6 x 6	632	12	100	5,466.8	81.0	10,400	38.7	Stiff loamy clay. Water table, 25 feet.
Windermere	La Mirada	Los Angeles	16	8 x 8	528	12	120	7,065.6	104.7	17,920	36.3	Light sandy loam. Water table, 10 feet.
Meechan (Long Belt)	Live Oaks	Sonoma	22	10 x10	596	22	120	12,672.0	187.7	37,800	46.6	Deep, fine grained loamy sand. Water table, 20 to 25 feet.
Fruitvale	Fruitvale	Alameda	25	6 x 6	776	18	150	16,694.8	247.9	54,200	57.8	Heavy loamy clay with adobe. Water table, 20 to 25 feet.
Meechan (Stony Pt.)	Stony Point	Sonoma	30	8 x 8	724	16	130	10,491.2	155.4	27,920	53.5	Sedimentary soil. Water table, 10 to 20 feet.
Meechan (Faught)	Stony Point	Sonoma	30	8 x 8	732	15	130	10,671.2	158.1	25,000	63.9	Fine loamy sand. Water table, 50 feet.
Meechan (Shropshire)	Live Oaks	Sonoma	30	9 x 9	516	12	100	4,974.8	73.7	9,320	35.5	Fine sand mixed with clay. Water table, 30 to 35 feet.
Meechan (Ellis)	Live Oaks	Sonoma	30	10 x10	684	16	110	8,701.6	128.9	21,010	44.1	Fine light sand with clay. Water table, 15 to 20 feet.
McDonald	El Cajon	San Diego	30	10 x10	300	15	120	4,056.4	60.1	10,160	19.9	Fine loose loamy sand. Water table, 12 to 15 feet.
Therefall	Newark	Alameda	32	6 x 6	540	20	170	15,836.4	234.6	57,820	41.2	Adobe loam. Water table, 14 to 15 feet.
Jewett	Elmira	Solano	35	10 x10	344	22	130	10,377.2	153.7	36,020	21.9	Fertile clayey loam. Water table, 25 to 30 feet.
Webb	Hayward	Alameda	36	8 x 8	168	19	110	5,178.8	76.7	17,600	10.9	Hard adobe clay. Water table, 40 feet.
Linda Vista	Mission San Jose	Alameda	40	8 x 8	612	18	150	15,139.6	224.3	50,620	50.0	Hard clay loam with adobe. Water table, quite deep.

Sprout growth.

Glass	Watts	Los Angeles	8	8 x 8	1,064	11	90	3,888.8	57.6	5,740	34.2	Stiff sandy loam. Water table, 15 to 25 feet.
Montague	Watts	Los Angeles	8-9	8 x 10	928	10	90	3,530.0	52.3	4,080	35.5	Stiff heavy loamy sand. Water table, 12 feet.
Thaxter	Nadeau	Los Angeles	11-13	8 x 8	1,024	10	80	1,642.8	24.3	1,240	19.5	Light loamy sand. Water table, 16 to 30 feet.
Thaxter	Nadeau	Los Angeles	13-20	10 x 10	608	12	130	4,964.8	73.5	10,320	34.7	Light loamy sand. Water table, 30 to 35 feet.

*A California cord is equal to ¾ of a Standard cord.

†The total expressed in board feet is not in addition to the total stated in cubic feet and in cords, but is another way of expressing the same total.

It is evident that the quality of the land determines to a large extent the rate of growth, so it is possible that some of the companies may be able to produce groves having a yield in excess of those shown in the above tables. Investors must bear in mind, however, that such has not yet been proven. Companies are for the most part claiming 100,000 feet board measure per acre in ten years. Such an estimate might under the most favorable conditions be possible but scarcely probable. The Forestry Society of California is responsible for this estimate. Their literature is quoted pretty generally and has been given pretty wide circulation. An investigation of the society showed it to be composed of a membership of a few over a hundred. Over fifty per cent of them were interested in some kind of a eucalyptus proposition. It was customary at first to issue monthly a list of inquiries to its members that follow up letters which might be written for the purpose of consummating a sale. It was learned after awhile that the members of the society were divided into three classes, one class received a complete list, another an abbreviated one, and the last none at all.

The by-laws of the society contemplated an organization similar to those in other states, and has naturally been considered by most persons as being authentic. It does not deserve its name nor should it be considered in any wise similar to other forest societies. There is no doubt but its sole function has been to boost the eucalyptus industry by publishing unreliable information. Some of the publications were prepared by an advertising agency. No field work was undertaken. The investigation was made before declining to serve as one of the board of directors. I understand that a recent reorganization has discontinued the more objectionable publications, and that a prompt revision of all its literature is contemplated.

During the fall of 1909 and the spring of 1910 approximately 23,000 acres were planted to eucalyptus. Blue and red gum were mostly used. Such an investment in land and equipment would certainly justify the State in procuring an adequate forest experimental station that additional species might be tried out, germinating tests made, and a limited amount of nursery stock distributed to various portions of the State to determine temperature requirements. Then, too, permanent plantations should be established to determine the exact rate of growth and yield under proper management. No recommendations to purchase such a site are made, however, since the fire situation is of far more importance at present.

This office is called upon continually to substantiate the estimated profit made by the different companies to be derived from eucalyptus plantations. So far no small trees are being used to any extent for purposes other than fuel, consequently no data on stumpage prices is available.

Whether lumber sawn from small immature trees can be profitably handled in our hot interior valleys remains to be seen. So far, anyway, a satisfactory method of seasoning has not been discovered. This problem is of vital importance, and one that should be solved without further delay. It is recommended, therefore, that no reduction be made in the appropriation asked for, since an estimate of $2,000 for conducting the work has been included.

Establishment of Plantations—Plant Material.

Numerous dealers scattered throughout the State raise forest tree stock of the kinds commonly planted in California, and a supply of seed or plant material of the species needed for commercial or protective planting may readily be obtained. When plant stock is purchased from dealers, that which has been raised in California nurseries is to be preferred to stock shipped from Eastern nurserymen and raised under different climatic conditions. The trees which are suitable for planting in California may be readily propagated, and when required in large quantities for extensive planting operations, plant material may be raised at home at expense considerably less than nurserymen's figures.

Planting Season.

Two seasons divide the year in the valley portions of California treated in this report. The rainy season of winter months begins in most sections during November or December, although in exceptional years there is little rainfall before January or even February. The rainy season continues into the spring, but is generally concluded by May, and, except along the coast line, showers are very infrequent during May and June. Months of continued dry weather succeed the rainy season, during which no precipitation may be expected.

To insure successful growth, plantations must be set out during the period of abundant moisture supply in winter months. During this season young trees should make rapid growth and extend their roots below the surface soil layers into deeper and moister strata to enable them to survive the long summer dry season. In most sections of the California valleys killing frosts occur at various times during the winter rainy season, and in some cases even as late as March or early April. Most trees suitable for planting in California are quite hardy, even when young, and may be set out in December or January upon the opening of the rainy season.

Young acacias and eucalypts and some other species are sensitive to cold, and when planted early in the rainy season, they are likely to be killed back by late frosts. In most sections of the valleys, the planting of acacias is inadvisable before March. These trees are relatively drought-resisting, however, and they may therefore be successfully

planted later in the rainy season without requiring irrigation during the summer than many other trees. Other frost-tender trees planted in California are those generally selected for ornamental and protective planting. Wind-breaks and shade trees may be planted in later spring months, since their needs for water during the dry season may be supplied by irrigation.

Spacing.

The spacing selected is a matter of great importance in setting out commercial plantations. Best results will be secured in California by planting trees not wider than 8 by 8 feet apart. Dense planting is desirable in order that forest conditions may be established as speedily as possible, and that soil moisture may be conserved for the use of the growing trees. When densely planted trees form a cover over a planting site, and the necessity for prolonged soil cultivation is avoided. Close planting also stimulates the growth of trees to merchantable form and proportions. Hardwood trees have a tendency to low spreading form, but when close planted they grow up tall and straight with unforked stems and few side branches. Low branching is prevented, and a long, clear bole suitable for timber is produced.

In plantations trees grow rapidly in height but more slowly in diameter. The comparatively slender form of trees in planted stands is often discouraging to planters familiar with the rapid increase in diameter of open growing trees. On this account, and because close planting necessitates the thinning of a stand after the early years of its growth, too wide a spacing is frequently chosen in planting to secure the best results. Moderately close spacing is requisite if stands are to grow thriftily to produce merchantable timber.

The spacing of trees recommended for California planting as close as 4 by 4 feet apart is inadvisable. Planted in such density trees will be crowded and their growth retarded. On the other hand, the drought and rapid evaporation during the summer dry season in California render the selection of a spacing wider than 8 by 8 feet apart inadvisable in planting even the more rapid growing species. A spacing of 6 by 6 feet apart may be recommended as most advisable for commercial plantations of nearly all species. Where it is desired to stimulate the growth of plantations by continuing cultivation as long as possible, a spacing 4 by 8 feet apart, requiring practically the same number of trees, may be selected.

A uniform spacing should be adopted and maintained in setting out plantations, and planted rows should run straight to insure trees from injury in cultivation. Planting sites may be marked out with a corn marker and stakes set where trees are to be planted. When necessary, rougher methods may be resorted to, or the spacing may be determined by pacing at the time of planting.

Soil Preparation and Planting.

Planting sites should be cultivated for tree plantation as thoroughly as for field crops. Where preliminary soil cultivation can not be given the commercial planting of trees is generally inadvisable. At planting time the young trees may be set out in holes opened with a spade or mattock. Plant stock may be carried down the planting rows in buckets, the young trees being taken out one by one as required for planting. Coniferous seedlings should be carried in buckets with their roots in a thin paste of mud and water. If they are exposed and become dried out the young trees will die. Hardwood seedlings are much more hardy and will not be injured by slight exposure during planting.

Cultivation.

During the long continued dry season the thorough cultivation of plantations becomes essential in order that the moisture in the lower strata may be conserved for the use of the growing trees. In the first summer cultivation should begin after the close of the rainy season, and should continue at intervals of about a month until the fall rains. With most trees cultivation will also be necessary during the dry season in the second year's growth. After the second summer the young trees should have grown sufficiently to shade the ground and cultivation will no longer be necessary. Level cultivation should be practiced rather than hilling up of the rows of trees, since by the latter practice soils are rapidly dried out. Shallow rooting trees are liable to injury from deep cultivation, and shallow cultivation, similar to that given a citrus crop, is preferable in plantations of most trees.

Irrigation.

By the selection of early planting seasons, when the soil is thoroughly moist and precipitation is abundant, the necessity of supplying trees with water even at the time of planting may generally be avoided. Irrigation adds greatly to the cost of maintaining plantations. When several different species may be grown for the same purpose, those capable of growing without irrigation should be selected. Irrigation stimulates the trees to rapid growth, but does not force them to root deeply for moisture. For lack of roots reaching down to the moisture strata they are likely to suffer severely if for any reason irrigation has to be suspended. Irrigated plantations of eucalypts, cottonwood, poplar, and catalpa in dry sections of the valleys have suffered severely from a sudden cessation of the irrigation. The growth of the trees has been stunted, and by their death from drought plantations have slowly thinned out.

In more arid sections of Modoc, Inyo, and Mono counties, and especially in the Imperial section, irrigation is essential to permit the suc-

cessful growth of even more drought resisting trees like black locust and green ash.

Thinning.

Where trees are set out as close as 6 by 6 feet apart, the stand will soon become too dense for the rapid development. The close planting will stimulate rapid height growth and will clean the stems of branches. After this advantage has been secured, it is generally desirable to thin plantations in order to secure more rapid growth in diameter. The inferior, crooked, forked, and branchy trees should first be removed, leaving the better trees to develop. The thinning should be evenly distributed through the plantation and large openings avoided.

With most species the first thinnings should not be made before the tenth year. If the stand becomes too dense after this thinning, it may be repeated after the fifteenth year. Not more than 40 per cent of the trees originally planted should be removed in the thinning. The trees cut may often be used for fuel or post material.

Protection.

Plantations should be protected from injury from fire and from grazing animals. Damage from fire does not seriously menace plantations in the settled valleys, but abundant fuel of dry grass and fallen litter covers the ground in planted groves. If grass fires are carelessly allowed to run into plantations, serious injury will result from the burning of the bark about the base of the trees. Insects and fungi find access to the wood at wounds burned in the bark, and by the separation of the bark around the burned portion of the trunk trees may be girdled and killed. Fires starting near a plantation should be extinguished before damage is done. During the dry season precaution may be taken against fire danger by surrounding planted groves with a strip of plowed land.

Planted groves should also be fenced for the exclusion of cattle. Stock allowed to run in a plantation seldom benefit it and may cause serious injury. Where the trees are planted sufficiently dense, there is at best little feed for cattle upon the ground. When run in planted groves, cattle browse upon the foliage of the trees, but only very young plantations suffer damage from this source. However, loosening of the surface soil stimulates the growth of planted trees, while the tramping and packing of the surface by pastured cattle produces the opposite effect and is certain to damage a plantation. The soil in pastured groves is generally scantily covered with litter. It bakes and dries out rapidly, and the growth of the stand is frequently stunted.

LIST OF SPECIES.

The following list gives the common and botanical names of trees planted in California:

Common name.	Botanical name.
Black locust	Robinia pseudacacia
Honey locust	Gleditsis triacanthos
Cork elm	Ulmus racemosa
White elm	Ulmus americana
Black walnut	Juglans nigra
California walnut	Juglans californica
Butternut	Juglans cinerea
Green ash	Fraxinus lanceolata
White ash	Fraxinus americana
Chestnut	Castanea dentata
Cottonwood	Populus deltoides
Lombardy poplar	Populus nigra
Liquid-ambar	Liquidambar styraciflua
Tulip tree	Liriodendron tulipifera
Horse chestnut	Aesculus hippocastenea
Basswood	Tilia americana
White birch	Betula populifolia
Shagbark	Hicoria ovata
Pignut	Hicoria glabra
Pecan	Hicoria pecan
Sugar maple	Acer saccharum
Silver maple	Acer saccharinum
Red maple	Acer rubrum
Norway maple	Acer platanoides
Boxelder	Acer negundo
Osage orange	Toxylon pomiferum
Red mulberry	Morus rubra
Russian mulberry	Morus alba tartarica
Catalpa	Catalpa bignonioides, Catalpa speciosa
Tupelo	Nyssa sylvatica
Bur oak	Quercus macrocarpa
Water oak	Quercus nigra
Tan oak	Quercus densiflora
Valley live oak	Quercus agrifolia
Cork oak	Quercus suber
English oak	Quercus robor
Magnolia	Magnolia grandiflora
Pepper tree	Schinus molle
Ailanthus	Ailanthus glandulosa
Umbrella	Melia azederach
Chinaberry	Sapindus marginatus
Weeping willow	Salix babylonica
Silk oak	Grevilia robusta
Camphor	Camphora officinalis
Sterculia	Sterculia sp.
Acacia	Acacia bayleyana
Acacia	Acacia floribunda
Golden or broad-leaved wattle	Acacia pycnantha
Silver or black wattle	Acacia mollissima
Black or green wattle	Acacia decurrens
Blackwood or black wattle	Acacia melanoxylon
Oriental sycamore	Platanus orientalis
Paulownia	Paulownia imperialis
Aruacaria	Araucaria sp.
Casuarina	Casaurina sp.
Rubber tree	Ficus elastica
Jacaranda	Jacaranda sp.
Pittosporum	Pittosporum sp.

LIST OF SPECIES—Continued.

Common name.	Botanical name.
Monterey pine	Pinus radiata
Coulter pine	Pinus coulteri
Digger pine	Pinus sabiniana
Yellow pine	Pinus ponderosa
Sugar pine	Pinus lambertiana
Torrey pine	Pinus torreyana
Bishop pine	Pinus muricata
Red pine	Pinus resinosa
Perry pinon	Pinus parryana
Austrian pine	Pinus laricio
Scotch pine	Pinus sylvestris
Italian pine	Pinus pinea
Jerusalem pine	Pinus halipensis
Canary pine	Pinus canariensis
Maritime pine	Pinus maratima
Monterey cypress	Cupressus macrocarpa
Guadalupe cypress	Cupressus arizonica
Italian cypress	Cupressus sempervirens
Redwood	Sequoia sempervirens
Big tree	Sequoia washingtoniana
Incense cedar	Libocedrus decurrens
Douglas fir	Pseudotsuga taxifolia
Norway spruce	Picea excelsa
Blue spruce	Picea parryana
Lawson cypress	Chamaecyparis lawsoniana
Deodar	Cedrus deodara
Cryptomeria	Cryptomeria japonica

Reforestation.

Although so much planting has been done in the valleys, very little has been accomplished in reforesting the mountains; this, in spite of the fact that it is the more important matter of the two. The reasons are three: The difficulty of protection, uncertainty as to the best and cheapest methods to adopt and as to the results to be expected, and the small regard which lumbermen had for denuded land while large bodies of virgin timber could be obtained cheaply. The last reason is no longer operative, because large bodies of virgin timber can no longer be obtained cheaply. The first can be made inoperative by the installation of a fire protective system, of which a nucleus is asked for elsewhere in this report. There remains the second reason, and for lack of experimental and investigative work we are as far as ever from a solution of the problem. For unless the area reforested could be protected afterward, the work of course would not pay, and it would be useless to work out problems of reforestation which could not be put to practical service when successfully solved. The time has come, however, when a beginning must be made, for lumbermen are already interesting themselves in the question and will be ready by the time results are obtained to put them to the practical test.

Aside from the fundamental problem of protection the most important points to determine are (1) the cheapest methods of restocking denuded land satisfactorily, and (2) the length of time that must elapse before the area restocked will furnish merchantable timber.



Natural Reforestation.

The merchantable timber has been logged off; fire has killed the remaining trees, and the area has reverted to brush. White fir is slowly creeping in, and finally the brush will be shaded out and forest conditions established. Seed trees of valuable species should have been left and protected. What effect would fire have on this area?

The first point requires experiment. In general, it may be assumed that the most suitable species to use will prove to be those which are indigenous. In this the problem of reforestation differs at once from that of afforestation, in which exotic species are more suitable.

The first thing to determine is whether or not with suitable protection from fire natural reseeding of certain areas can be accomplished through seed from scattered surviving trees. This method requires no outlay, except that for protection, and can no doubt be carried out successfully on many areas. It has the disadvantage, however, of being uncertain, and usually will have to be assisted by artificial methods before a fully stocked stand can be secured. Most areas, also, are so clogged with brush that a means must be devised of geting rid of it before reseeding to prevent the young trees from being choked out. The lands which require reforestation belong in large measure to lumbermen. Some, doubtless, have been sold to the State for taxes after being cut over, but this has by no means been the rule. In spite of their apparent worthlessness for forest purposes, lumbermen have generally preferred to pay the tax on such lands rather than let them revert to the State. The burden of taxation has hitherto not been very great, and the lands usually occupy more or less critical situations with regard to rights of way, etc., which circumstances make it both necessary and easy for the lumberman to retain control.

The fact that they are privately owned, however, makes the problem of reforestation more difficult, because it brings up the question of profitability. The Federal Government or the State may assume at the outset that any scheme that will convert a brush patch into a young forest at a reasonable cost would be well worth while. The private individual, however, must be assured that the conversion is not only feasible but profitable as well. This necessitates the calculation of rates of growth of the important species for various conditions of soil and situation, and computations of yield at different periods to determine the rotation under which the forests should be managed. The collection of such figures has barely been begun.

CHAPTER IV.

THE FOREST LAWS.

In the following pages the state forest laws are taken up in detail. Each section is first given just as it appears in the forest law pamphlet issued to firewardens and to the general public. Following each section is a discussion of it, in which such changes as have been suggested by experience are recommended.

Chapter 264, Laws of 1905 (p. 235).

An act to provide for the regulation of fires on, and the protection and management of, public and private forest lands within the State of California, creating a State Board of Forestry and certain officers subordinate to said board, prescribing the duties of such officers, creating a forestry fund, and appropriating the moneys in said fund, and defining and providing for the punishment of certain offenses for violations of the provisions of this act, and making an appropriation therefor.

SECTION 1. *State board of forestry.*—There shall be a State Board of Forestry, consisting of the Governor, Secretary of State, Attorney General and State Forester, which shall supervise all matters of state forest policy and management, and convene upon the call of the Governor or of its Secretary.

No suggestions.

SEC. 2. *State Forester and his duties.*—There shall be a State Forester, who shall be a civil executive officer, and who shall be a technically trained forester, appointed by the Governor, to hold office at the pleasure of the appointing power; and whether any candidate for the position is a technically trained forester shall be determined by certificate from the Secretary of the United States Department of Agriculture, or from the Department of Forestry of the State University after such department is established. He shall receive a salary of twenty-four hundred dollars per annum, and shall be authorized and empowered to appoint two assistant foresters, whose salaries shall not exceed twelve hundred dollars each per annum. He shall maintain headquarters at the State Capitol in an office provided by the Secretary of State, and shall be allowed necessary office and contingent expenses. He and his assistants shall be paid reasonable traveling and field expenses which may be incurred in the necessary performance of their official duties. He shall act as secretary of the State Board of Forestry. He shall, under the supervision of the State Board of Forestry, execute all matters pertaining to forestry within the jurisdiction of the State; have charge of all firewardens in the State, and direct and aid them in their duties; direct the protection and improvement of State parks and forests; collect data relative to forest destruction and conditions; take such action as is authorized by law to prevent and extinguish forest, brush and grass fires; enforce all laws pertaining to forest and brush-covered land, and prosecute for any violation of such laws; coöperate with land owners, as described in section four in this act; and publish from time to time such information of forestry as he may deem wise. He shall prepare annually a report to the Governor on the progress and condition of State forest work, and recommend therein plans for improving the State system of forest protection, management and replacement.

I recommend that the provision regarding assistant state foresters be taken up in a succeeding section; and that certain other changes be made so that the section will read as follows:

SEC. 2. *State Forester and his duties.*—There shall be a State Forester, who shall be a civil executive officer, and who shall be a technically trained forester, appointed

by the Governor, to hold office at the pleasure of the appointing power; and whether any candidate for the position is a technically trained forester shall be determined by certificate from the Secretary of the United States Department of Agriculture, or from the Department of Forestry of the State University after such department is established; or by diploma from a Forestry School of recognized standing. He shall receive a salary of four thousand eight hundred dollars per annum and shall be allowed necessary office and contingent expenses. He shall be paid reasonable traveling and field expenses which may be incurred in the necessary performance of his official duties. He shall act as secretary of the State Board of Forestry. He shall, under the supervision of the State Board of Forestry, execute all matters pertaining to forestry within the jurisdiction of the State; have charge of all firewardens in the State, and direct and aid them in their duties; direct the protection and improvement of state parks and forests; take such action as is authorized by law to prevent and extinguish forest, brush, and grass fires; enforce all laws pertaining to forest and brush-covered land, and prosecute for any violation of such laws; coöperate with land owners, as described in section four of this act; and collect and publish from time to time such information of forestry as he may deem wise. He shall prepare biennially a report to the Governor on the progress and condition of state forest work, and recommend therein plans for improving the state system of forest protection, management and replacement. Salary, $4,800.

In the section as amended no reference is made to "headquarters at the State Capitol in an office provided by the Secretary of State." There are certain advantages derived from having the office located at the seat of government, and Sacramento is also geographically central. In spite of these facts, however, the efficiency of the office would be greatly increased if headquarters were removed to San Francisco. The State owns very little forest land, and except the California Redwood Park and the Bidwell tract at Chico, none that is under the jurisdiction of the State Forester. Any reforms in forest management effected by this office must, therefore, be made by first prevailing upon private owners of forest land to accept our suggestions, and in order to gain the confidence of the private owners of timber land, there must be more personal intercourse between them and the State Forester than has hitherto been possible. Most of the timber owners, whose holdings are large enough to affect the welfare of the State according as they are managed well or ill, maintain offices in San Francisco, and it would be of inestimable benefit if the members of this office could be in a position to meet those important men without requiring to make formal appointments with them as at present we must. It is principally for this reason that San Francisco was given preference over Sacramento when the location of the Federal forestry headquarters for the District of California was being determined.

It goes without saying that with headquarters in San Francisco this office would be in much closer touch with the California Redwood Park and with the University. It seems to me particularly desirable that the office should be within easy reach of the University.

An important part of our work consists in educating the public to take a proper scientific view of the subject of forestry. Undoubtedly there are many students who would be glad to receive more detailed

instruction in forestry, however elementary, and until a regular department of forestry is established at the University these could be taken care of by general courses given by members of this office. Such courses could not take the place of a regular department of forestry, but they would help a student to determine at least whether or not it would be advisable for him to follow forestry as a profession; and furthermore, would tend to make the true principle of forestry more generally known.

I strongly recommend, therefore, that the headquarters of this office be removed from Sacramento to San Francisco.

The present law requires an annual report to the Governor. The practice in other state departments is to submit reports biennially just before each session of the legislature; and since the Forester's report consists of a review of the work done with special reference to necessary legislation, it would seem that a report every two years would be sufficient. Such information of general interest or educational value as is collected and compiled by the office is published at whatever time it is ready. This would not be affected by prolonging the period between formal reports.

SEC. 3. *Supervision and care of state parks.*—The California Redwood Park and the Mount Hamilton tract, together with all moneys heretofore or hereafter appropriated for the purchase of land for or care of said parks, tracts and stations, shall be in charge of the State Board of Forestry, said board to take the place of and forthwith shall have all the powers and duties now possessed in accordance with law by persons or commissions with regard to the state parks, tracts of land, and forest stations mentioned in this act, and also any forest or brush land which may hereafter become state property, or be placed definitely in the care of the State; and it is hereby further enacted that, if the government of the United States or any individual or corporation shall, at any time, donate or intrust to the State of California, for state park or state forest reserve purposes, any tract or tracts of wholly or partially wooded land, such tract or tracts of land shall be administered at the expense of the State, as provided by law.

Originally, this section carried control over the Chico and Santa Monica forestry stations. The amendment defeating this did not cut out all references, hence, left superfluous and ambiguous wording which should be struck out as indicated. The Mount Hamilton tract can not legally be taken from the custody of the University, so reference to it should be omitted.

After the words "shall be," line 19, should be inserted this further authorization: "accepted on behalf of the State by the State Board of Forestry and by it * * *."

SEC. 4. *Coöperative work.*—The State Forester shall upon request and whenever he deems it essential to the best interests of the people and the State, coöperate with counties, towns, corporations, and individuals in preparing plans for the protection, management, and replacement of trees, wood lots, and timber tracts, on consideration and under an agreement that the parties obtaining such assistance pay at least the field expenses of the men employed in preparing said plans.

By changing "shall," line 1, to "may," this section is made more consistent. At present it is both mandatory and discretionary.

SEC. 5. *Publication of laws and notices.*—The State Forester shall prepare and print for public distribution an abstract of all the forest laws of California, together with such rules and regulations in accord therewith, as he may deem necessary, and shall annually print and distribute a list of all firewardens with their addresses, all such matter to be published with the approval of the State Board of Forestry. He shall also furnish notices, printed in large letters on cloth, calling attention to the danger from forest fires, and to forest fire and trespass laws and their penalties. Such notices shall be posted by the firewardens in conspicuous places along every highway in brush and forest-covered country, at frequent intervals along streams and lakes frequented by tourists, hunters, or fishermen, at established camping sites, and in every post office in the forested region.

No suggestions.

SEC. 6. *Fire districts.*—The State Forester shall divide the State into such number of fire districts as shall be deemed by him most necessary to the efficiency of his work; and, furthermore, any county or combination of less than four counties, shall be made a separate fire district, upon request of the county board or boards of supervisors, in which case such special fire district shall pay the cost of maintaining its district firewardens.

This section is entirely unnecessary and should be stricken out. It is the remnant of a section in the original bill which failed of passage, providing for ten district firewardens to be paid by the State.

SEC. 7. *Duties of assistant foresters.*—The duties of the assistant foresters shall be to devote their entire time to state forest interests according to rules and directions to be determined by the State Forester, with the approval of the State Board of Forestry. They shall take prompt measures to prevent and extinguish forest fires; keep a record of the cause, extent and damages of all forest fires in their respective districts, and perform such other duties as the State Forester may direct.

I suggest that this section be entirely changed to read as follows:

SEC. 7. *Assistants to the State Forester.*—The State Forester shall be authorized and empowered to appoint a Deputy State Forester, at a salary of three thousand dollars per annum, who shall represent the State Forester during the latter's disability or absence; also to appoint an Assistant State Forester, at a salary of two thousand dollars per annum. These assistants shall be trained foresters, shall devote their entire time to state forest interests as directed by the State Forester, and shall be reimbursed for official traveling and field expenses. They shall have the powers of firewardens. The State Forester shall also be authorized and empowered to appoint two forest engineers at a salary of one thousand two hundred dollars each per annum. They shall devote their entire time to state forest interests as directed by the State Forester and shall be reimbursed for official traveling and field expenses. They shall have the powers of firewardens.

Two forest engineers are urgently needed because of the increased demands made up this office. During eight months of each year the amount of current business is entirely out of proportion to the present force, not to make mention of an immense amount of investigative work that should be undertaken at once. One of the engineers will be used in conducting seasoning experiments with eucalyptus at the Santa Monica Experiment Station. Thousands of dollars are being invested in eucalyptus plantations, and it is decidedly up to the State to solve the problem of properly seasoning this wood, thereby encouraging new industries and creating a demand for new species. Similar experiments will be conducted for handling tanbark oak. The two projects will take nearly four years.

The second engineer will be detailed chiefly to forest measurements for the first two years. Such work is as time-taking as it is important. Before determining upon the financial rotation of our commercial species, the rate of growth and yield for each must first be accurately known. This can be done only by taking a large number of systematic measurements, the results of which will largely determine whether or not it will pay a company or an individual to hold logged-off lands for a second cut. This is just what the lumbermen of the State want to know, and given the necessary assistants and an adequate appropriation, this office can tell them.

SEC. 8. *Voluntary firewardens and their duties.*—The State Forester shall appoint in such number and localities as he deems wise, public-spirited citizens to act as voluntary firewardens, who may receive payment for their services from the counties or from private sources. They shall promptly report all fires and take immediate and active steps toward their extinguishment, report any violation of the forest laws, assist in apprehending and convicting offenders, and perform such other duties as the State Forester may direct. The supervisors and rangers on the Federal forest reserves within the State, whenever they formally accept the duties and responsibilities of firewardens may be appointed as voluntary firewardens, and shall have all the powers given to firewardens by this act.

SEC. 9. *Powers and requirements of firewardens.*—The State Forester and all firewardens shall have the powers of peace officers to make arrests without warrant for violations of any State or Federal forest laws, and no firewarden shall be liable to civil action for trespass committed in the discharge of his duties. Any firewarden who has information which would show with reasonable certainty, that any person had violated any provision of such forest laws, shall immediately take action against the offender, either by using his own powers as a peace officer or by making complaint before the proper magistrate, or by information to the proper district attorney, and shall obtain all possible evidence pertaining thereto. Failure on the part of any *paid* firewarden to comply with the duties prescribed in this act shall be a misdemeanor and punishable by a fine of not less than twenty dollars nor more than two hundred and fifty dollars, or imprisonment for not less than ten days nor more than three months, or both such fine and imprisonment, and the State Forester is hereby authorized to investigate and prosecute such violations.

These sections may properly be combined to read as follows:

SEC. 8. *Voluntary firewardens, their powers and duties.*—The State Forester shall appoint, in such number and localities as he deems wise, public-spirited citizens to act as voluntary firewardens; they shall have the powers of peace officers to make arrests without warrant, for violation of any State or Federal forest laws, and to issue or refuse burning permits as provided in subsection 3 of section 384 of the Penal Code; and no firewarden shall be liable to civil action for trespass committed in the discharge of his duties. They shall promptly report all fires and take immediate and active steps toward their extinguishment; report any violation of the forest laws, assist in apprehending and convicting offenders, and perform such other duties as the State Forester may direct. Any firewarden who has information which would show with reasonable certainty that any person had violated any provision of such forest laws shall immediately take action against the offender, either by using his own powers as a peace officer, or by making complaint before the proper magistrate, or by information to the proper district attorney, and shall obtain all possible evidence pertaining thereto. The supervisors and rangers on the Federal forest reserves within the State, whenever they formally accept the duties and responsibilities of firewardens, may be appointed as voluntary firewardens, and shall have all the powers given to firewardens by this act.

SEC. 10. *Assistance of citizens in fighting fire.* (Penal Code, section 384, subsection 5. See below, page 157.)

SEC. 11. *Fire patrol.*—In times and localities of particular fire danger the State Forester may maintain a fire patrol, through the firewardens, at such places in brush or forest land, as the public interest may require, the expense of such patrol to be paid by the county in which such patrol is maintained; and, furthermore, he may,

upon written request by counties, corporations, or individuals, maintain a fire patrol on their forest lands; *provided*, that the expense of said patrol be paid by the party or parties requesting same.

Any fire law to be effective must provide for both the prevention and extinguishment of fires, and the machinery for this purpose must be well organized and adequately paid. The counties may have paid firewardens appointed, and may make provision for meeting the expenses of fighting fires if they wish to, and many of them do. But public sentiment is lax with regard to forests in some of the most important timber counties, and these make no such provisions voluntarily. The fact that public sentiment is lax in these counties is, of course, the strongest proof that forest protection is needed, and the above section is the only means the State Forester has to compel these counties to take an interest. At present the State assumes the right to direct the work of fire fighting and to collect half the fines imposed for violation of the forest laws, but leaves the counties to bear alone the expense. If the State were to agree to share the expenses of forest protection there would be much less necessity of coercing refractory counties under the above section. I suggest, therefore, that section 11 be divided into two sections, numbered 11 and 11*a*, to read somewhat as follows:

SEC. 11. When any county, through its board of supervisors, shall agree to coöperate with the State for the prevention of forest, brush or grass fire, or for the improvement of forest conditions, the State Forester shall assist same county board to install a system for such purposes, and shall appoint the necessary firewardens. The extent, manner, and compensation of their services and of all attendant expenses shall be fixed by agreement between the State Forester and said board, and the State shall contribute not to exceed half the cost of said system nor more than one thousand dollars annually to any county.

SEC. 11*a*. In any county containing forest or brush land where no coöperative system of forest protection exists, organized under the provisions of section 11, the State Forester may take such measures for the prevention and extinguishment of forest fires as the public interest may require. Two thirds the expense of such measures to be borne by the county in which the work is done; *provided*, that not more than one thousand dollars shall be charged to any one county in one year under the provisions of this section; *and provided further*, that the provision of this section shall not apply to counties in which a coöperative forest system exists between the county and the State Forester, organized under the terms of section 11.

Provision should also be made for State coöperation with timber owners in the matter of fire protection.

SEC. 12. *District attorneys to prosecute vigorously.*—Whenever an arrest shall have been made for violation of any provision of this act, or whenever any information of such violation shall have been lodged with him, the district attorney of the county in which the criminal act was committed must prosecute the offender or offenders with all diligence and energy. If any district attorney shall fail to comply with the provisions of this section he shall be guilty of a misdemeanor, and upon conviction shall be fined not less than one hundred dollars nor more than one thousand dollars, in the discretion of the court. Action against the district attorney shall be brought by the Attorney General in the name of the people of the State on the relation of the State Forester. The penalties of this section shall apply to any magistrate with proper authority, who refuses or neglects to cause the arrest and prosecution of any person or persons when complaint, under oath, of violation of any terms of this act has been lodged with him.

This, as well as the succeeding section, might properly be added to the Penal Code.

SEC. 13. *Destruction of warning notices.*—Any person who shall destroy, deface, remove, or disfigure any sign, poster, or warning notice posted under the provisions of this act, shall be guilty of a misdemeanor and punishable, upon conviction, by a fine of not less than fifteen dollars nor more than one hundred dollars, or imprisonment in the county jail for a period of not less than ten days nor more than three months, or both such fine and imprisonment.

No suggestions, except that the section might be added to the Penal Code.

SEC. 14. Willfully, maliciously, and negligently setting forest fires. (Penal Code, section 384, subsection 1.)

SEC. 15. Extinguishment of camp fires. (Penal Code, section 384, subsection 1.)

SEC. 16. Restrictions of use of fire during a dry season. (Penal Code, section 384, subsection 3.)

SEC. 17. Engines in forest land. (Penal Code, section 384, subsection 4.)

See below under Penal Code.

SEC. 18. *Civil liability for forest fires.* In addition to the penalties provided in this act, the United States, State, county, or private owners, whose property is injured or destroyed by such fires, may recover in a civil action double the amount of damages suffered if the fires occurred through willfulness, malice, or negligence; but if such fires were caused or escaped accidentally or unavoidably, civil action shall lie only for the actual damage sustained as determined by the value of the property injured or destroyed, and the detriment to the land and vegetation thereof. The presumption of willfulness, malice or neglect shall be overcome; *provided*, that the precautions set forth are observed; *or, provided*, fires are set during a "dry season" with written permission of and under the direction of the district firewarden. Persons or corporations causing fires by violation of this act shall be liable to the State or county in action for debt, to the full amount of all expenses incurred by the State or county in fighting such fires.

This should be amended by striking out the words "the district firewardens," and substituting the words "a state firewarden." The last sentence should continue after "such fires" with "in addition to fines and costs of trial and collection for which they are found liable through criminal proceedings."

SEC. 19. *Clearing along county roads and on land after lumbering.*—Counties along the county roads, in forest or brush land, shall, when so directed by the State Forester, and in a manner and to an extent prescribed by him, cut and remove all brush, grass, and inflammable material from their rights of way. If such clearing is not done within a reasonable time after notice, said time to be fixed by the State Forester, the State Forester shall have it done and the county shall be liable to the State in an action for debt to the amount of the expense thus incurred, and in addition thereto for the expense of any fire patrol rendered necessary by such delay. *It is provided further*, that all lumber companies, corporations, or individuals shall, when so instructed by the State Board of Forestry, and at a time and in a manner prescribed by said board, carefully burn their slashings, by which is meant the tops, limbs, and general débris left after lumbering.

This section has never been thoroughly tested in practice. So much of it as refers to counties would be rendered unnecessary if section 11 as amended and section 11*a* are enacted into law, and should therefore be cut out.

The portion relating to lumber companies might be extremely useful, but is robbed of any real force by lack of penalty. The most serious fires are, as a rule, those that run unchecked through cut-over land,

for by destroying the seed supply they ruin the hope of a future crop. Progressive lumbermen realize this, and are disposing of their slash either in the spring or the fall, and protecting the land afterward, with a view of logging it a second time when the young trees shall have grown to merchantable size. This sort of thing should be encouraged, and the unprogressive lumberman should, if necessary, be forced to come into line. I recommend, therefore, that the section be amended by striking out all matter relating to counties, and by adding after the portion referring to lumber companies authority to the State Forester to clean up dangerous slashings at the expense of the owners somewhat as the Horticultural Commissioner destroys infected fruit trees.

It would also be advisable to give the State Forester authority to control tree diseases by having dangerously infected trees removed. California forests as yet have not suffered severely from epidemics of disease, but this fact is no guarantee for the future. In fact, at present in the northern part of the State the attacks of tree destroying beetles are becoming more and more frequent, and in western Siskiyou County have become so severe that the owners of the infested trees have appealed to this office for advice and assistance. This invasion though serious is limited in area, and on account of the ready coöperation of the owners of the timber will be repelled next fall. But if certain of the owners were not alive to the necessity of stamping out the pest, the work of their more enlightened neighbors would be in vain unless the law gave the State Forester the right to take action in spite of them.

SEC. 20. *Disposal of moneys received as penalties.*—All moneys received as penalties for violations of the provisions of this act, less the cost of collection, and not otherwise provided for, shall be paid into the state treasury to the credit of the forestry fund, which fund is hereby created, and the moneys therein are hereby appropriated for purposes of forest protection, management and replacement under direction of the State Board of Forestry.

Subsection 7 of section 384 of the Penal Code provides that "one half of all fines paid into any county treasury upon conviction under this section shall be paid by the county treasurer into the state treasury to the credit of the forestry fund." These two sections should be made consistent, one half of all penalties being paid to the counties in all cases. I believe, furthermore, that the best interests of the State would be served if the State's half of the fines received as penalties for violation of the forest laws were paid to the firewardens, through whom convictions were secured. This would undoubtedly result in a greater number of convictions, and in consideration of this the State could well afford to do without the money that now falls to its share.

I recommend, therefore, that the section be amended to read as follows:

"One half of every fine imposed as a penalty for violation of the forest laws shall be paid to the firewardens through whose efforts conviction was secured. The remain-

der, less the costs of trial and collection, shall be paid into the general fund of county treasury."

SEC. 21. *Moneys for forest purposes.*—County boards of supervisors may appropriate money for purposes of forest protection, improvement and management.

This section apparently does not add anything to the provisions of section 33½ of "An act to establish a uniform system of county government," and should be cut out.

SEC. 22. *Payment of expenses under this act.*—There is hereby appropriated for the fifty-seventh and fifty-eighth fiscal years the sum of seventeen thousand six hundred dollars ($17,600) for carrying out the provisions of this act, and for the payment of all salaries and expenses herein provided for.

This should not be a section of a general act, but should be an act by itself. It is discussed elsewhere in this report.

SEC. 23. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

County Co-operation.

The provisions made by the above sections, 4, 6, 8, 11, 19, and 21, for the coöperation of counties with the State is supplemented by the following act (Stats. 1905, 394):

SECTION 1. A new section is hereby added to the act to establish a uniform system of county and township governments, to be numbered 33½, and to read as follows:

SECTION 33½. To appropriate from the general fund of the county, unless otherwise provided, not exceeding in counties of the first and second class, the sum of twenty thousand dollars, and in all other counties not exceeding the sum of ten thousand dollars in any one year, to aid and carry on the work of the preservation of forests upon public lands, the reforestation of forests upon public lands, and the protection of forests upon public lands from fire.

I suggest that this section be amended by striking out all references to public lands. If by "public lands" is meant the lands still in the United States public domain the act is practically void, for these lands are necessarily of the least importance of any in the county. There is no necessity for any discrimination, but on the contrary all forest lands should be treated equally. It should be understood that the term "forest" includes brush and woodlands.

Fire Laws and Penalties.

Chapter 536, Laws of 1907. (Approved March 23, 1907.)

SECTION 1. Section 384 of the Penal Code is hereby amended to read as follows:

384. Any person who shall willfully or negligently commit any of the acts hereinafter enumerated in this section shall be guilty of a misdemeanor, and upon conviction thereof be punishable by a fine of not less than twenty-five nor more than five hundred dollars, or imprisonment in the county jail not less than fifteen days nor more than six months, or both such fine and imprisonment, except that in case of an offense against subsection five of this section, the fine imposed may be not less than ten dollars.

If possible this method of stating the penalties for offenses against subsections of this section should by all means be avoided. It necessitates a participial phrasing for the subsections, which is very confusing.

The forest laws should be as simple as it is possible to make them; and to this end the offense and the penalty should be stated in the same subsection, and in such a way that exceptions and provisos shall be reduced to the minimum.

Subsection 1. *Carelessness with fire.*—Setting fire or causing or procuring fire to be set to any forest, woodland, brush, prairie, grass, grain, stubble, or any other material being or growing on lands not his own, without the permission of the owner of such land; *provided*, that it shall be lawful to build, in a careful manner, camp-fires on any unenclosed lands, the owner of which has not forbidden such building of camp-fires thereon by personal notice or by posting such prohibition in conspicuous places or otherwise; *and providing further*, that before departing from the place where such camp-fire has been built, the builder of such fire first totally extinguishes the same.

This subsection is a good example of the involved construction which should be avoided. It could be improved by making a separate subsection of the two provisos regarding camp-fires.

Subsection 2. *Allowing fires to escape.*—Allowing fires, lawfully set, to escape from the control of the person having charge thereof, or to spread to the lands of any person other than the builder of such fire.

No suggestions.

Subsection 3. *Use of fire during a dry season.*—Building a fire on his own land for the purpose of burning brush, stumps, logs, rubbish, fallen timber, fallows, grass, or any other thing whatsoever, or blasting wood with dynamite, powder, or other explosives, or setting off fireworks in forest or brush-covered land, either his own or the property of another during a dry season; *provided*, that any State or district warden may, in his reasonable discretion, give a written permit to any person desiring to build fires or blast as aforesaid; such permit shall contain such rules and regulations for the building and management of such fires as the State Board of Forestry may from time to time prescribe, and no person shall be convicted under this subsection who shall upon the trial prove, affirmatively, that he has complied with all the rules and regulations so prescribed; *and provided further*, that any person engaged in logging redwood may carefully use explosives or fire in the manner in which it is now customarily used in such logging.

The State Supreme Court, in the case of McCapes, declared the above subsection unconstitutional. The following opinion was written by Justice Henshaw:

Crim. No. 1526.

IN RE MCCAPES ON HABEAS CORPUS.

Petitioner was charged with and convicted of a violation of subdivision of section 384 of the Penal Code. That section declares it to be a misdemeanor if any person shall willfully or negligently "build a fire on his own land for the purpose of burning brush, stumps, logs, rubbish, fallen timber, fallows, grass, or any other thing whatsoever, * * * *provided*, that any state or district firewarden may in his reasonable discretion give a written permit to any person desiring to build fires," etc. He earnestly contends that the section under which he is charged is unreasonable and oppressive, that it unduly and unwarrantedly interferes with his right to the enjoyment and use of his property, and that thus and therefore it is in violation of section 1 of the fourteenth amendment of the Constitution of the United States and of section 1 of article 1 of the Constitution of this State. The contention of the petitioner we think must be upheld.

It is to be noted that the act is designed to prevent the destruction of property, and particularly of forests, by the careless setting of fires. In its purpose and purview, therefore, the act is within the police power of the State. No one at this day

can be unaware of the great havoc wrought by forest fires, and, indeed, in states such as this, which undergo long periods of drouth, of the loss which results from fires sweeping over the farming lands and destroying the crops. The purpose of the law being for the general good of the State, to prevent the destruction of property by fires carelessly set and allowed to escape control, not only brings the act strictly within the police power, but the purpose must commend the act to every court. Nevertheless, in the accomplishment of that purpose, it is quite plain that the legislature has transgressed all reasonable bounds. It is in exemplification of what this court said in *Ex parte Jentzach*, 112. Cal. 468: "So, while the police power is one whose proper use makes most potently for good, in its undefined scope and inordinate exercise lurk no small danger to the republic. For the difficulty which is experienced in defining its just limits and bounds, affords a temptation to the legislature to encroach upon the rights of citizens with experimental laws, none the less dangerous because well meant."

We are here concerned only with the validity or invalidity of subdivision 3 of section 384, under which this petitioner is charged. But a consideration of other sections will serve to illumine the discussion. Section 1 makes it a misdemeanor to set fire to any forest, woodland, brush, prairie, grass, grain, stubble, or any other material, being or growing on lands not owned by the person who may set the fire, without the permission of the owner of such land, but the same section permits one to build camp-fires upon lands not his own without the permission of the owner or anybody else if the lands are unenclosed, if the camp-fire is built "in a careful manner," and if, before departure from the place where such camp-fire has been built, the builder "first totally extinguishes the same." But by section 3, a man can not build a fire on his own land for the purpose of burning brush, stumps, logs, rubbish, fallen timber, fallows, grass, or any other thing whatsoever, without first obtaining a permit so to do, or unless the fire be built (subdivision 5) in good faith and with reasonable care as a "back fire" for the purpose of stopping the progress of a fire then actually burning. Railroad companies in the dry season frequently burn the woods along their rights of way for the very purpose of preventing fires. Road overseers and supervisors do the same thing along the highways. Yet under this law, not only may this not be done, but a farmer may not burn a brush pile or rubbish heap in his back yard without first obtaining from some firewarden, and if in his county there be no such firewarden, he may not make a fire at all, until in due course one shall have been appointed, to whom he may make petition. The language of this section is so broad as to have little or no relation to the real purpose of the act. It prevents the setting of any fire without permission from a firewarden, though the fire be set with scrupulous care, and by no possibility could work the destruction of property. Such a law upon the face of it is an unreasonable interference with the rights of property. But if it be said that notwithstanding the language the law will be given a construction which will avoid hardship, it must be answered that by its terms it makes it a crime for any man to light a fire on his land for the purpose of burning "anything whatsoever," and he declares the person who does do so a criminal, regardless of the fact that the fire was carefully set and guarded and regardless of the fact that no injury to anybody resulted from the setting. In other words, every person so setting a fire would be guilty of a crime, and the question or not as to whether he should be punished would rest largely in the friendship or hostility of his neighbors, or of the informer who by this law receives one half of the fines upon conviction. The facts in the case at bar may be referred to in illustration of the working of such a law. The petitioner was digging a well upon his own land. It became necessary for him to blast rock. Fearful lest a burning fuse hurled by the exploding blast might set fire to the grass in the vicinity, he prudently and carefully burned off this dry grass without causing the slightest damage to any property. He built this fire, however, without obtaining permission from a district firewarden. Indeed, at the time that he set it there was no district firewarden. Subsequently the county of Madera caused the appointment of a firewarden, and this firewarden procured the arrest of the defendant for a violation of the law. This brief statement will better serve to illustrate the unreasonableness of the law than would many pages of exposition.

It is unnecessary to elaborate upon the principle involved in this determination, namely, that while the right to legislate in the exercise of the police power is fully acknowledged by the courts, in each instance the question as to whether or not the constitutional rights of the citizen as to his person or property have been unduly invaded is always a judicial question. It is sufficient upon this to refer to such cases

as *Ex parte Whitwell*, 98 Cal. 73; *Ex parte Jentzach*, 112 Cal. 468; *Ex parte Dickey*, 144 Cal. 234; *Ex parte Hayden*, 147 Cal. 649; *Ex parte Drexel*, 147 Cal. 763; *Ex parte Dietrich*, 149 Cal. 104; *In re Kelso*, 147 Cal. 609.

For the foregoing reasons the prisoner is discharged.

HENSHAW, J.

We concur:
LORIGAN, J.
MELVIN, J.
ANGELLOTTI, J.
SHAW, J.

This decision nullified the whole section except the portion referring to the use of fire in logging redwood, and did away with the necessity for burning permits. Since, however, the burning permit system is recognized in section 18, and since, furthermore, it was the evident intention of the legislature to enable a person wishing to burn brush and rubbish to avoid criminal responsibility in case his fire escaped from control by securing a permit from a firewarden, it was thought best not to abandon the system entirely, but to modify it so as to retain all of the advantages that could be retained. Accordingly, the following note was printed directly after this section in the forest law pamphlet to serve as a guide to firewardens in issuing permits:

The State Supreme Court has declared the above subsection unconstitutional in so far as it relates to burning permits. If burning permits are applied for, firewardens may issue or refuse them as heretofore, but no person should be prosecuted for starting a fire *on his own land* without a permit, unless such fire escapes to the land of another.

If permit is first obtained and the terms of it complied with, no criminal action should, in any case, be begun against the permittee. Those who wish to burn with reasonable care may show their good faith by securing a permit from a firewarden, which will be considered as relieving them from criminal responsibility.

Firewardens will continue to prosecute vigorously cases that arise under subsection 2 unless the burning was done in strict compliance with the terms of a burning permit.

This section should be amended in accordance with the decision of the court.

Subsection 4. *Engines and boilers.*—Using any logging locomotive, donkey or threshing engine, or any other engine or boiler, except such as use oil exclusively for fuel, in or near any forest, brush, or grass land, unless he shall prove upon the trial, affirmatively, that such engines or boilers used by him were provided with adequate devices to prevent the escape of fire or sparks from smokestacks, ashpans, fire boxes, or other parts, and that he has used every reasonable precaution to prevent the causing of fire thereby.

No suggestions. An excellent provision.

Subsection 5. *Citizens obliged to fight fire when called upon.*—Refusing or failing to comply with the summons of any firewarden authorized to call out persons to aid in extinguishing forest fires, unless prevented by good and sufficient reasons.

No suggestions. Has worked well.

Subsection 6. *Back-firing.*—No person shall be convicted under this section who shall have set, in good faith and with reasonable care, a back-fire for the purpose of stopping the progress of a fire then actually burning.

No suggestions.

Subsection 7. *Disposal of fines.*—One half of all fines paid into any county treasury upon conviction under this section shall be paid by the country treasurer into the state treasury to the credit of the forestry fund.

This section has already been discussed above. It should be amended so that one half of the fines goes to the firewardens securing the conviction and the other half to the county.

SEC. 2 Sections 384*a* and 384*b* of the Penal Code, and all acts and parts of acts inconsistent with this act are hereby repealed.

Penal Code: SEC. 600. Every person who willfully and maliciously burns any bridge exceeding in value fifty dollars, or any structure, snowshed, vessel or boat, not the subject of arson, or any tent, or any stack of hay or grain or straw of any kind, or any pile of baled hay or straw, or any pile of potatoes, or beans, or vegetables, or produce, or fruit of any kind, whether sacked, boxed, or crated, or not, or any growing or standing grain, grass, or tree, or any fence, or any railroad car, lumber, cordwood, railroad ties, telegraph or telephone poles, or shakes, or any tule land or peat ground of the value of twenty-five dollars or over, not the property of such person, is punishable by imprisonment in the state prison for not less than one year nor more than ten years.

No suggestions.

Penal Code: SEC. 602. Every person who willfully commits trespass by either
1. Cutting down, destroying, or injuring any kind of wood or timber standing or growing upon the lands of another; or
2. Carrying away any kind of wood or timber lying on such lands—is guilty of a misdemeanor.

No suggestions.

Civil Code: SEC. 3346. For wrongful injuries to timber, trees, or underwood upon the lands of another, or removal thereof, the measure of damages is three times such a sum as would compensate for the actual detriment, except where the trespass was casual and involuntary, or committed under the belief that the land belonged to the trespasser, or where the wood was taken by the authority of highway officers for the purposes of a highway; in which cases the damages are a sum equal to the actual detriment.

No suggestions.

Code of Civil Procedure: SEC. 733. Any person who cuts down or carries off any wood or underwood, tree or timber, or girdles or otherwise injures any tree or timber on land of another person, * * * without lawful authority, is liable to the owner of such land, * * * for treble the amount of damages which may be assessed therefor, in a civil action, in any court having jurisdiction.

No suggestions.

Code of Civil Procedure: SEC. 734. Nothing in the last section authorizes the recovery of more than the just value of the timber taken from uncultivated woodland, for the repair of a public highway or being upon the land or adjoining it.

No suggestions.

CHAPTER V.

APPROPRIATIONS AND EXPENDITURES.

The appropriations for the sixty-first and sixty-second fiscal years were as follows:

Salary of State Forester	$6,000 00
Salary of Deputy State Forester	3,600 00
Salary of Assistant State Forester	3,200 00
For support of State Board of Forestry, including field and traveling expenses	15,000 00
For printing, binding, ruling, etc.	2,500 00
For improvement and maintenance of the California Redwood Park	10,000 00
Total	$40,300 00

The expenditures under this appropriation were as follows:

Appropriation for salary of State Forester		$6,000 00
Salary of State Forester		4,000 00
Balance November 1, 1910		$2,000 00
Appropriation for salary of Assistant Forester		$3,200 00
Salary of Deputy State Forester		2,400 00
Balance November 1, 1910		$1,200 00
Appropriation for salary of Assistant State Forester		$3,200 00
Salary of Assistant State Forester		2,133 36
Balance November 1, 1910		$1,066 64
Appropriation for the support of the State Board of Forestry		$15,000 00
Equipment, supplies, and miscellaneous	$784 06	
Freight, express, telegraph, and telephone	223 97	
Postage	175 36	
Fire investigations, forest studies, educational work, etc.	4,500 51	
Janitor	390 00	
Stenography and typewriting	1,657 93	7,731 83
Balance November 1, 1910		$7,268 17
Appropriation for printing		$2,500 00
Fire warnings and notices	$919 75	
Stationery	158 25	
Binding	86 50	
Fire data and reports, warden reports, forms, etc.	319 50	1,484 00
Balance November 1, 1910		$1,016 00
Appropriation for California Redwood Park		$10,000 00
Warden's salary (16 months)	$2,000 00	
Foreman's salary (16 months)	1,600 00	
Permanent and miscellaneous improvements	1,056 59	
Fire trails and road repair	419 89	
Equipment and supplies	1,195 73	
Sprinkling roads	377 50	
Miscellaneous	33 15	6,682 86
Balance November 1, 1910		$3,317 14

While there seems to be a pretty large unexpended balance in the support fund, yet it is no more than is necessary to properly carry on the work that has been arranged for. A portion of it has been held back for undertaking extensive field investigations that could not be properly conducted last summer because of the unusual fire danger.

The remaining balance in the printing appropriation is insufficient for the remainder of the fiscal year. In addition to paying for the printing of this report three others, the results of special studies, will be ready for printing by March 1st, and one is already complete. Then, too, a supply of fire warnings and similar material will be needed before the next appropriation is made available. Consequently, it will be necessary to ask for a deficiency appropriation.

The following estimate shows the actual amount necessary to properly conduct the work of this office for the sixty-third and sixty-fourth fiscal years:

Salaries:	
State Forester	$9,600 00
Deputy State Forester	6,000 00
Assistant State Forester	4,000 00
Two forest engineers	4,800 00
Support of State Forester's office, including field and traveling expenses	18,200 00
Printing and binding	5,000 00
Improvement and maintenance of California Redwood Park	15,000 00
Forest protection	50,000 00
Special appropriation for construction of building in California Redwood Park—dining-room, kitchen, baths, and sleeping quarters	10,000 00
Total	$122,600 00

SUMMARY OF RECOMMENDATIONS.

It is urgently recommended that an appropriation of $50,000 be made for forest protection, to be used as discussed in this report.

That an appropriation of $10,000 be made for the construction of a suitable building to provide accommodations for the number of visitors to the Redwood Park, who must now of necessity be refused. The plans should be prepared and executed, and the money expended by the State Engineer's office.

That the appropriation for the maintenance and improvement of the California Redwood Park be increased from $10,000 to $15,000, thereby providing for the proper up-keep of nearly 30 miles of fire trail. Such trails are nearly useless unless kept free from inflammable material.

That the appropriation for printing and binding be $5,000, being an increase of $2,500. Data collected by this office is wanted by the people. It is of little value unless the results of investigations and studies can be published.

That the appropriation for the support of the State Forester's office, including field and traveling expenses, be $18,200, being an increase of $3,200. This increase is necessary if the salary appropriations are increased to provide for two forest engineers.

That the rank of forest engineer be created at a salary of $1,200 per annum, and that an appropriation of $4,800 be made to employ two such men.

That the salary of the Assistant State Forester be fixed at $2,000 per annum, being an increase from $1,600, and that an appropriation of $4,000 be made for this purpose.

That the salary of the Deputy State Forester be fixed at $3,000 per annum, being an increase from $1,800, and that an appropriation of $6,000 be made for this purpose.

That the salary of the State Forester be fixed at $4,800 per annum, being an increase from $3,000, and that an appropriation of $9,600 be made for this purpose.

That the section pertaining to the tree squirrel be repealed.

Special attention is directed to the fact that the duties and responsibilities of this department are quite as exacting and as great as many others; that the foresters are all technically trained men, and it is essential that they should be, but that the salaries are not in proportion to the magnitude of the work, nor are they, comparatively speaking, equivalent to similar important departments of the State. It is urged, therefore, the appropriations be made as recommended.

To the foregoing recommendations we add a recital of the circumstances attending the death of Samuel L. Sloane of Dehesa, San Diego County, while fighting a forest fire under the orders of state firewardens, and which we regard as entailing a grave moral claim against the commonwealth for the support of his surviving wife and children. The fire occurred September 15, 1909, and Sloane, and his son John, were ordered to assist in controlling it. The fate of Sam Sloane is told by an eyewitness: "Suddenly the wind began to blow again, a hard wind, and all the ridge below which we considered extinguished, burst into flame. Sam Sloane at this time, although not visible to us, must have been in the canyon which was covered with brush and rocks to the north of the ridge. I began running down the hill, John Sloane following. When I arrived at a point about 35 yards from the edge of the grain field, I saw a figure come out of the flames. It was Sam Sloane. He must have passed through the thick of the flames. He was trotting and falling down every few feet, but would stagger up and continue. His clothes were all burned completely off, one small piece of sleeve was burning on his right arm when I reached him, his hair was gone and his eyes seemed blinded and most of his skin was burned to a crisp. When I reached him he said, 'Oh, I'm burned to a frizzle.' We carried him toward the grain field. He seemed to know his son's voice. I was notified that Sam Sloane had died."

He is survived by a wife and six or seven children, the eldest about twenty years of age.

The State Board of Forestry feels keenly its obligation to men like Sam Sloane of Dehesa. Since he lost his life in obeying a summons to fight a forest fire, disobedience to which is punishable by fine, we are strongly of the opinion that some compensation should be made his family. His wife and children should not, in addition to the personal loss which can not be remedied, suffer the economic loss of his breadwinning, which the State can make good. We recommend the vote of money to the family of Sam Sloane as the discharge of an actual indebtedness.

REPORT

ON THE

Labor Laws and Labor Conditions

OF FOREIGN COUNTRIES

In Relation to Strikes and Lockouts

Prepared for the information of His Excellency

GOVERNOR JAMES N. GILLETT

BY

HARRIS WEINSTOCK

Special Labor Commissioner



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LETTER OF TRANSMITTAL.

To His Excellency, GOVERNOR JAMES N. GILLETT,
State Capitol, Sacramento, Cal.

DEAR SIR: I have the honor to hand you herewith my report in the execution of the commission I hold from you as Special Labor Commissioner to examine into the labor conditions and labor laws of foreign countries, and to report thereon to you, the Executive of the State of California.

I have, during the past fifteen months, visited Italy, Russia, Austria, Germany, Belgium, France, England, the British Colonial States of Victoria, and New South Wales, in the Commonwealth of Australia, and the Dominion of New Zealand, and have investigated their labor laws and labor conditions.

I have now the honor to submit this as my report covering these various investigations, and to embody in a final chapter such general conclusions as I have been enabled to reach, and such recommendations for proposed legislation as in my opinion is likely to lessen strikes and lockouts in the Commonwealth of California.

Respectfully yours,

HARRIS WEINSTOCK.

January 10, 1910.

REPORT ON

LABOR LAWS AND LABOR CONDITIONS

OF FOREIGN COUNTRIES.

ITALY.

In my investigations of the labor laws and the labor conditions of Italy, I find from inquiries made of Dr. Marchetti of the Government Labor Bureau, which is a branch of the Ministry of Agriculture, Manufactures and Commerce, that labor legislation in Italy is much occupied just now with the problem of legalizing and regulating collective bargaining as between associations of workers and associations of employers, more especially in its bearings on agricultural labor contracts, agricultural labor having attained a high degree of organization in Italy, the unions numbering 270,000 members, plus sixty or seventy thousand organized outside the federation. In the National Council of Labor, on which the government is represented, there is a strong current in favor of introducing into such collective bargaining a clause enforcing compulsory arbitration in labor disputes, but such a measure requires careful study before being concreted, as there is strong opposition to it, especially on the part of the workers themselves, who think their interests are better safeguarded by avoiding all such compulsory intervention.

Three private bills will be brought into the House of Deputies by the Hons. Bissolati, Nicolini, and Alessio, in favor of a law for compulsory arbitration, and the government has promised to study them and incorporate the principle in a measure of its own initiative; but it is easy to foresee that months, if not years, will have to pass before such a project is concreted. There already exists in most trades permanent arbitration bodies, known here as "Probiviri," chosen half amongst the workers and half amongst the employers, elected at fixed intervals, generally every two years, to whom disputes arising as to the interpretation of a contract can, if desired, be submitted both by masters and men, and it is proposed to extend such boards, whose awards are taken

into consideration by the courts should the dispute be carried into them, to agricultural labor.

UNIONISM.

It would seem that unionism is a comparatively young movement in Italy, the first labor unions and Chambers of Labor (Camere di Lavoro) having been formed in industrial centers in 1892, though they only assumed real importance after the great labor and political difficulties of 1898. The organization of the peasantry into leagues of resistance is still more recent, dating back only to 1901, when it started in the province of Mantua after an unusual outbreak of strikes and lockouts in rural districts. The movement was started and directed by the Socialist leaders and is still almost entirely in their hands, though in Romagna some strong organizations are in the hands of the Republican party. These organizations differ widely in different provinces in their aims and methods. In many parts they aim at regulating the phenomenon of the internal emigration of farm laborers from one province to another, which has assumed very large proportions in Italy. In other regions, and more especially in Emilia, such organization takes the form of the collective leasing of farms which are exploited on a coöperative basis; this feature has attained great developments and yielded many interesting and valuable results. Since the creation of the agricultural unions, which have given rise to many big and closely contested strikes, there has been a marked advance in the wages paid to farm hands, raising them in some districts from thirteen cents per day to sixty-five, or a gain of about five hundred per cent, and nearly everywhere the pay has nearly or more than doubled, but it is not even claimed by the unionists that this marked difference is wholly due to organization. In many regions, notably in the southern provinces, emigration is mainly responsible, as labor has become very scarce and can command its own price; in other parts where the emigration phenomenon has not made itself felt, factors have been the high degree of prosperity which has prevailed in Italy as elsewhere for the last few years, the higher price commanded by many products, migrations to cities, due to the increased industrial activities, and the general increase in the cost of living due to the diminished purchasing power of money. The opponents of unionism indeed maintain that there is little relation between the growth of unionism and the increase of wages other than that of coincidence, but it is generally admitted that unionism has had its share in raising the standard of living.

The statistics published by the Labor Bureau show that unionism has not had much influence on the length of the working day, though in some places it has brought about this change: That pay, instead of being by the day as formerly, is by the hour, which has tended to put

a premium on long rather than on short hours, due to the desire of the workers to make a large wage. Many farm laborers work as many as fourteen hours a day in the busy season in those regions where they live on the fields they till; in other provinces the working day is of nine and one half hours, as the laborers live in villages often at a considerable distance from their work, and the difference of time is largely taken in going to and from their homes.

LABOR SAVING DEVICES.

The increased cost of farm labor has tended to promote the introduction of better methods of farming, as the landowner has had to have recourse to this means of increasing the yield of his land as an offset to the larger slice now given to labor. So far as conditions permit labor saving devices are being introduced, and this without, as a rule, exciting the opposition of the unionists, whose organizations, largely controlled by the Socialists, can not consistently object to the application of machinery. Many such devices, however, are not of practical utility in many regions where the acreages are generally very small and cultivated intensively, as in Tuscany, for instance, where on a small farm olive trees and vines are cultivated in the same field as the corn, which is sown in narrow strips between them. Also large areas are hilly or mountainous, and there again machines, such as reapers or mowers, would be impracticable. But in Lombardy, Emilia, Latium, and elsewhere, there is an increasing demand for agricultural machinery, and in some districts there is a tendency towards coöperative purchase and operating of same.

It might be presumed that the highly increased cost of labor would have diminished noticeably the returns cashed by the landowners and thus have tended to depress land values. It would appear, however, that the reverse has taken place. This is due in the first place to the improved methods of farming introduced, partly as the result of the increased cost of labor and partly owing to the active educational propaganda carried on by the Italian government by means of traveling chairs of agriculture, experimental fields, etc., and also to the decline in the capitalization value of money. The value of many products has also risen considerably. Another determining factor is the land-hunger of the Italian emigrants who return home with their savings and who are keen bidders for available land, which they are willing to acquire at almost any price to gratify their ambition to become landowners on however so small a scale.

CONDITION OF THE LABOR MARKET.

It is feared that should commercial depression in America continue and lead to the return on a large scale of Italian emigrants, such return

would tend to overload the labor market, and might seriously disturb recent prosperity and check the advance in wages, prices, and land values which has been continuous of late. So far, however, the official returns received by the Labor Bureau show that although large numbers of emigrants have returned, no bad effects have as yet been felt; and indeed their return is welcomed in many districts where the scarcity of labor has begun to be so seriously felt as to constitute a cause of impoverishment to the southern provinces and to compromise their economic prosperity.

STRIKES.

In a conversation with Professor Giovanni Montemartini, Director of the Labor Bureau, I made some inquiries as to the nature of the great agricultural strike now being fought in the province of Parma, which is focusing the attention of Italians of all parties on the problems connected with labor, and I elicited from him that Parma and the neighboring districts of central Italy are hard affected by the emigration movement, which has done so much to raise wages in other parts of Italy, and consequently the agricultural laborers have had to resort to organization and strikes in order to improve their conditions. Recently the peasant organizations of the province of Parma have come under the influence of the "Syndicalist" section of the Socialist party, which is in favor of direct economic as opposed to parliamentary action, and favors a policy of harassing the landowners by continual strikes, boycotts, etc., in the hope that they will at last find it impossible to carry on their farming operations, and will thus be willing to rent their lands to unions of peasants, who would propose to exploit them collectively. This is the theory underlying the syndicalist movement, but in practice the strike has been fought with the usual peaceful methods on the side of the peasants, and the whole dispute has turned on a question of the failure of the landowners to comply with certain clauses of an agreement stipulated between them and the peasantry in 1905. But, on the other hand, the landowners have organized and are now conducting the strike in an aggressive spirit with the object of breaking up the organizations, and enforcing the principle of the "open shop." Twenty thousand organized peasants are involved in this strike, which has already lasted over a month, and the termination of which it is impossible to foresee. The landowners have succeeded in migrating their live stock, one of the principal assets of the province, to other parts of the country, the peasants on their side are sending away their children, who are gratuitously received and cared for by the organized workers in the towns all over the peninsula. The government so far has preserved an absolutely neutral attitude.

The agricultural laborers' organizations are federated, and the na-

tional federation counted over 350,000 members a few years ago. Its membership is now reduced to 270,000, as the organizations which have come under the syndicalist influence, such as those of Parma, have seceded.

COMPULSORY ARBITRATION.

To my inquiries as to how the question of compulsory arbitration was viewed in Italy, Professor Montemartini replied that public opinion on the question is directed along three currents, one favoring the creation of permanent arbitration boards, to which the parties to a dispute could voluntarily have recourse at any time; another in favor of compulsory conciliation boards, to which all disputes would have to be submitted before either masters or men could declare hostilities; and a third in favor of compulsory arbitration. The serious dimensions assumed of late by strikes, such as those of railway employees, and more especially the gravity of many agrarian strikes in some of which the military have been called out and many lives lost, has strongly influenced public opinion in this direction. It is easy, however, to foresee that great difficulties would arise in enforcing any such measure. The measure which the Socialist deputy, Hon. Bissolati, intends placing before the Chamber, proposes to penalize manufacturers who refuse to obey the award of the arbitration board by closing their establishments, but no penalties are proposed for the workers who offer no security. The measure supported by the Hon. Nicolini proposes to keep back as security for the workers a certain proportion of their wages till the termination of the agreement under which they are engaged, but this again would be impracticable, except in certain classes of labor. On the whole, it may be said that there is a tendency among employers in industry to oppose compulsory arbitration, while the landowners would, as a rule, favor it. The Director of the Labor Bureau himself is opposed to the principle of compulsory arbitration, as he considers it wrong in principle and impracticable, except perhaps in those few industries which are government monopolies and in which it is possible to know the exact cost of production, and which have nothing to fear from foreign competition. He fears that in practice it might often have the effect of ruining an industry and increasing lack of employment. Undoubtedly the general public is, however, in favor of some such measure, as also certain sections of the Socialist party, though opinion there is very divided, as is seen by the fact that the railway workers' union has rejected the offer of compulsory arbitration. The Prime Minister, Giolitti, has made declarations in the Chamber to the effect that he does not favor for the present any project for compulsory arbitration, and that he considers it premature to talk of incorporating the labor unions, as is proposed in one of the measures to be brought before the Chamber.

Dr. Carroncini, also of the Labor Bureau, informs me that next month a law will come into operation for regulating the conditions of labor of workers in the rice fields in the provinces of Verona, Pavia, and Ferrara, and this law contains a clause for compulsory arbitration of disputes which may arise in this special industry. The board of arbitrators is to consist of three umpires selected by the masters and three by the men, presided over by the pretore or local magistrate, and its decisions are to be final and without appeal. Any refusal to obey the award will be punished by fines, amounting in the case of the workers to from 30 to 40 lire and in that of the employers to from 300 to 400 lire. In the case of the workers it is proposed to garnishee their wages in payment of the fines. The initiative of this law was taken by the government at the instigation of the landowners, and has met with much opposition on the part of the workers, and it is foreseen that it will be enforced with difficulty. The disputes which it will be called to decide upon will be mostly on minor questions concerning chiefly the interpretation of contracts. Should the law be successful in operation, it is likely to be broadened so as to cover other categories of agricultural work. Dr. Carroncini does not himself believe compulsory arbitration practicable or desirable, and remarks that in agricultural struggles it is wished for by the landowners, but opposed by the workers themselves. He considers that in all strikes the government should observe strict neutrality, limiting its action to preserving peace, and he considers that the conditions in agricultural struggles are such that when the government merely confines its action within these limits, it is already exercising pressure in favor of the landowners.

Nineteen hundred and seven was a record-breaking year for strikes in Italy, as they attained the number of 2,500, as against 900 for 1906 and 600 for 1905; it is probable now that the number will tend to decrease.

RUSSIA.

I have found that at this particular time it can hardly be said that Russia, like other countries, has a labor problem. It has solved this problem in rather an unique way, and yet not in a way that I should care to recommend to the government of California or to any other government. Prior to 1905 the government did not legalize the formation of labor unions. During the period of the revolutionary movement of that year, the government, in addition to granting a constitution and other concessions, also gave to labor the privilege to organize. The workingmen in all industrial parts of the empire promptly availed themselves of this concession, and powerful labor unions were speedily formed.

In Russian Poland, where are located the great manufacturing centers of Warsaw and Lodz, the industrial workers have been largely recruited from the peasantry. This element, when brought into the cities and away from home restraints, became more or less savage. Once organized and led, as many of them were, by Socialists and political leaders, who seemingly meant to use these organizations for revolutionary purposes, they became most unreasonable in their demands, and when these demands were denied, did not hesitate to resort to the knife and the revolver. In consequence, many violent strikes took place, and for a time a reign of terror existed in these centers. This situation, as I will presently show, played directly into the hands of the government.

It would seem that the Czar had yielded most unwillingly to the policy of granting a constitution and other concessions in the direction of personal and civil liberty. That these privileges were granted was due to the government overestimating the strength of the revolutionary party. The moment the Czar felt sure of the army and a slight weakness was shown on the part of the revolutionists, he immediately instituted a reactionary policy. A "pogrom" was arranged in secret by the "higher ups" of the government circles which was to go into effect simultaneously all over the empire, and which was to include a massacre of the revolutionists and those presumed to be in sympathy with them.

These massacres were to be conducted by a body since become known as the "Black Hundreds," the rank and file of which were made up of outcasts and criminals, known in Russia by the English title of "Hooligans." These Hooligans were to receive the protection, and did

receive the protection of the military and the police. And under the direction and protection of these governmental forces, thousands of innocent men, women, and children were butchered and slaughtered in many cities, towns, and villages throughout the empire for several days, and the contents of their homes and shops were looted and carried away by these freebooters with the fullest knowledge and consent of, and aided and abetted by, the military and the police.

The charge has been made that the Czar himself was at the head of this movement; that in advance he had promised to pardon every member of the Black Hundred who might be convicted of any crime committed during the proposed massacre.

What lends color to this charge, and what is maintained to be absolute proof of his complicity in these murders, is the fact that he has seemingly kept faith, and that he has actually pardoned every man since convicted in the courts of murder, arson, outrage, incendiarism, and all the other dreadful crimes committed during the days and nights of terror. Just at this writing, and as additional proof that the Czar was at least in perfect sympathy with the acts of the Hooligans, comes a wire dated at St. Petersburg, and published in a London journal, reading as follows: "It having been proposed to lessen the term of punishment inflicted on all the people condemned for being implicated in the Kieff 'pogrom,' the Czar has granted them a complete amnesty."

The statement was made to me by a prominent lawyer in Moscow who had carefully investigated the matter, that out of the thousands who took part in these massacres in various parts of the empire and who shed untold quantities of innocent blood, there is not one single offender to-day, despite hundreds of convictions, to be found in the prisons of Russia.

On October 30, 1905, the Czar in his proclamation to the people among other things said, "We lay upon our government the duty of executing our inflexible will by giving to the people the foundations of civil liberty in the form of real inviolability of personal rights, freedom of conscience, freedom of speech, freedom of public assembly, and freedom of organized association."

SUPPRESSION OF LABOR ORGANIZATIONS.

In consistence with the policy of reaction begun by the Czar immediately on the heels of this generous and liberal declaration, steps were taken to suppress all labor organizations. The labor leaders who permitted or encouraged violence on the part of union strikers played directly into the hands of the government by furnishing the needed pretext for the suppression of unionism, and despite the claim made that only a percentage of the unionists committed acts of violence, *all* unions were suppressed. According to the unrepealed

laws of Russia, labor is permitted to organize, but as a matter of fact, no labor meeting is permitted to take place without the consent of the chief of police, which consent is never obtainable. In consequence, labor unionism in Russia for the time being is paralyzed, and owing to lack of organization and also to lack of strike funds, strikes of any duration are practically impossible.

The statement was made to me by a leading Russian professor of political economy, who is an authority on the Russian labor question, that the Minister of the Interior refused to grant a certain employer permission to make certain wage concessions to his employees on the ground that to do so would encourage other wage-earners to make demands and thus lead to possible strikes.

At one of the great iron mills in southern Russia, after a lengthy interview with several wage-earners in the presence of the manager, I said to them, "Am I to understand that if you have grievances and hold a meeting to discuss them, agree upon them, set them forth on paper and appoint a committee to present them to your employer for his consideration, that you would be liable to punishment at the hands of the authorities?" "If we do all that you say," they answered, "the members of such a committee would speedily find themselves on the road to Siberia."

Appealing to the employer I asked if he did not think that such treatment of labor on the part of the authorities was most cruel and unjust. He answered saying that labor was not the only factor liable to such summary treatment. "I do not know what moment I, as an employer, may be thrown into prison by the order of the governor general of this province, who is all powerful, being in supreme control, and from whose judgments there is no appeal—kept there indefinitely, and, perhaps, finally transported to Siberia without even being informed of the nature of my offense or given an opportunity for a hearing or a fair trial."

In this wise, labor organizations in Russia have been terrorized by the government, and while secret unionism more or less prevails, its possibilities are enfeebled, and it can serve little or no practical purpose, for the reason that the members, and more especially the leaders, are subject to arrest, imprisonment, and exile as soon as they show their heads.

DIMINISHED EFFICIENCY OF RUSSIAN LABOR.

In the face of these conditions one would be led to believe that Russia should be the manufacturers' Mecca. Here, at least, he may be permitted to conduct his business without interference on the part of the labor picket or the walking delegate. Here he need now have no fears of arrogant labor committees calling on him and making unreasonable

demands which he dare not refuse without the risk of a strike which might destroy his business.

I think it was Herbert Spencer who once said that if you strike a blow with a hammer on a smooth sheet of tin you will find a dent therein; but if you turn the sheet of tin over you will find a corresponding elevation on the other side. The same law of cost and compensation is working its way out with the Russian labor situation. Instead of Russia, because of the suppression of labor unions, being the manufacturers' Mecca, it is proving to him a Waterloo.

Every Russian manufacturer with whom I spoke, and I had the opportunity of speaking with some of the largest in the empire, informed me that the diminishing efficiency of the Russian workman was becoming so serious that it was getting to be more and more of a problem as to how they could retain their business against the competition of foreign manufacturers who had the advantage of more efficient labor, and who were successfully invading their territory.

"Is the charge true that is made by employers that the efficiency of the Russian workman is declining?" I asked a group of intelligent Russian wage-earners whom I was interviewing.

"It is with regret that we must admit it to be true," they replied.

"Why is it true?"

"Because," they answered, "our employers are in league with the government to oppress and to suppress us. We have had locks put on our lips and manacles on our hands. We are helpless and almost hopeless. Surely, under these conditions, we can not be expected to be wildly enthusiastic over our employers' interest, nor can we be expected to give forth our best in return for treatment which is the worst. What have we to gain by working ourselves down to the bone? Nothing, absolutely nothing. We can hope neither for appreciation nor for more pay, and so it is only natural for us under these circumstances to give in return the least we can.

This object lesson effectively demonstrates the human law, that the governmental policy which destroys freedom of organized association, as in Russia, destroys at the same time the spirit of the worker also as in Russia, and turns the willing workman into an unwilling workman, thus making it impossible for such nation to advance or even to maintain its industrial position among the industrial nations of the world.

There is no other country in the world, the United States not excepted, that is so rich in material resources as the empire of Russia. Its hills and its mountains, its mines and its valleys, contain the hidden treasures of all the Indies. Yet, in the face of all this undeveloped but potential wealth, untold millions of Russians go hungry from the cradle to the grave.

Under an honest, wise, and beneficent administration, Russia could

become the wage-earners' Mecca, and Russian labor could be made happy and prosperous to a degree not to be surpassed in any other land. But as it is, the present condition and the future outlook for Russian labor is most gloomy and discouraging.

STRIKES.

In consequence of the strikes of 1905 and 1906, wages have risen from fifteen per cent to thirty per cent, but the cost of living has risen progressively, so that as a matter of fact, the absolute wages of the workingman have not increased, and where in the absence of organization no increase in wages took place, the wage-earner because of the increased cost of living is worse off than ever.

The only real advantage gained through strikes, and still enjoyed by many wage-earners, is the shortening of the hours of labor. The legal Russian working day is eleven and one half hours; the general working day at this time is ten hours, but many of the iron works have a nine-hour day, and some of the municipal undertakings have an eight-hour day.

WAGES.

Owing to the numerous religious and other holidays there are only from two hundred and eighty to two hundred and eighty-five labor days in the year. This, of course, militates against the earning power of the wage-earner, who, as a rule, is paid by the hour or by the working day.

The average wages of Russian workingmen will run from one hundred to one hundred and fifty dollars per annum. The cost of food for a Russian workingman is about four dollars and a half a month. His diet consists of bread, vegetables, and groats, meat rarely if ever being in reach of his meager earnings.

The condition of the peasants is even worse than that of the industrial workers. Professor Oseroff of the University of St. Petersburg, one of Russia's greatest political economists, is my authority for the statement that the average wage of peasant women who do the hardest sort of manual field labor is at the rate of ten cents for a day, which begins at four a. m. and does not end till eight p. m., and out of this pittance she must furnish her own food. Moreover, he went on to say that at times there are multitudes of women who stand in line waiting for an opportunity to secure work on these pitiable conditions. In the villages I have seen peasant girls employed as domestics for as little as one dollar a month, and seemingly glad of the opportunity to get food and shelter which their own homes do not afford.

Male peasants in summer earn from fifteen cents to fifty cents a day, and in winter from six cents to twenty cents a day, according to the quality and the strength of the worker.

The need for saving in the summer on the better wage rate in order

not to starve in the winter when there is not enough employment to go round, when there are great armies of unemployed peasants, is so imperative that a farmer employing a goodly number of peasants informed me that, as a rule, most of his peasant men and women work all the summer without spending one single penny for personal needs outside of food.

The manufacturing employers seem to feel that their inability to compete successfully with foreign manufacturers is due to the shortened hours of labor and the increased wage brought about by strikes. Now that strikes, because of the attitude of the government, have become almost impossible, they are taking steps to make a united effort to lengthen the working day and to cut down wages. All this in the face of increased cost of living from which the wage-earner can not escape.

In the opinion of a disinterested investigator such a policy, if successfully carried out, can but make a bad industrial condition much worse. Longer hours and cuts in wages must further add to the discontent and misery of the Russian wage-earner, and tend to make him still more inefficient, thus making it less and less possible for the Russian manufacturer to maintain his business even in his own home market, to say nothing of the markets of the world.

CONDITION OF RUSSIAN WAGE-EARNER.

The lot of the Russian wage-earner is the most unhappy in all the occident, and so long as it remains the policy of the Russian government to put a premium on ignorance, to discourage the education of her masses, to deliberately encourage, as she does on every hand, vice and immorality, in order to divert the thought and the energy of the people from politics, so long as the declaration of the Czar of October 30, 1905, that it is his inflexible will to give to the people, among other things, the freedom of organized association, remains a byword and a barefaced, empty lie, so long must the condition of the Russian wage-earner remain the most unhappy in all the occident.

Russia has nothing to offer in the way of hints or suggestions as to the most scientific method of preventing strikes and lockouts, other than by the most brutal use of force, by the exercise of arbitrary power and by robbing the wage-earner of the freedom of organized association.

Russia, however, by her mediæval and brutal methods in the treatment of labor, stands out as a most valuable object-lesson to the world how best to degrade the working classes, how best to arouse in them hatred and ill will, how best to fill their hearts with disloyalty to the government under which they live, how best to destroy their efficiency by killing the best within them and bringing out the worst within them, and how best to make it impossible, despite boundless natural wealth, to become a prosperous industrial nation.

AUSTRIA.

As Vienna is regarded by Austrian wage-earners as the city where the conditions for Austrian labor are the most favorable, and as Vienna is also the capital of the empire where are to be found the head centers for all information concerning labor and labor laws, I confined the limited time at my command to that city, where I was enabled to make a fairly exhaustive investigation and to get many different points of view on the question under investigation.

Through the courtesy of our American Ambassador, Charles D. Francis, I was enabled to meet the State Minister of Commerce, Dr. Alfred Grunsberger, and the State Minister of Public Works, Dr. Albert Gessmann, to both of which gentlemen I am indebted for much information.

Opportunities were also afforded me to have an audience with Mayor Lueger of Vienna, to meet with the secretaries of the Federated Trades and the Employers' Association, with several members of the Austrian Parliament who are also labor leaders, with editors of labor papers, and with various groups of workingmen. Opportunity was also given me to visit numerous homes of wage-earners and to talk directly with the occupants, so that on the whole my investigations were of a character to give me many different points of view on labor conditions and labor laws. I found some of these points of view most conflicting, as the interests of the informants happened to conflict. I followed the plan, however, of reaching conclusions by facts presented rather than by opinions offered.

CONDITION OF AUSTRIAN WAGE-EARNER.

Compared with his fellow-worker in Russia, I found the condition of the Austrian wage-earner most enviable. On the whole, the Austrian workman is better off than ever before, though there is very great room for further improvement in his condition. The Austrian wage scale has for several years been upward, until the recent depression, which naturally checked this tendency; but, as yet, there have been few instances where wages have been cut, and unless trade conditions grow materially worse, there is no present likelihood of wages declining. I found, however, that this upward trend of wages in recent years was largely confined to those branches of industry which have become unionized.

There has also been a progressive increase in the cost of living, so that unorganized labor, which has not participated, as a rule, in increased wages, has been badly pinched by the increased cost of rent and of foodstuffs.

The legal hours for a day's labor in Austria are eleven. The actual average working hours, however, are nine and a quarter.

The average earnings of an industrial worker are $240 a year, out of which he contributes $20, or eight per cent, to the funds of labor unions. According to the statement of Dr. Max Kaiser, the secretary of the Employers' Association of Austria, $2,800,000 of such funds had been used for political purposes in supporting the work of the Social Democrats, and $400,000 were used for strikes.

LABOR IN POLITICS.

Labor has largely concentrated its efforts on politics. Under the name of "Social Democrats," it wields important political power, having eighty-seven representatives in the lower house. By voting as a unit, this labor party has made itself keenly felt, especially since the representatives of the capitalistic and employing classes are split up into numerous political parties, thus minimizing their political strength.

TAXES.

In addition to contributing eight per cent of his earnings to labor unions, the Austrian workman is obliged to pay direct state taxes equivalent to about nine per cent of his income. This reduces his purchasing power to a sum on which it would seem impossible to the American workman even to exist, especially in the face of the stern fact that in the last few years the cost of living in Austria has increased from twenty-five to thirty-five per cent. As a consequence, even the best paid Austrian wage-earner does not enjoy the comforts, the conveniences, nor the standard of living within the reach of the ordinary American unskilled laborer. A workingman in Vienna, however favorable his conditions, rarely, if ever, occupies more than one room and a kitchen for self and family, no matter how large his family. I have visited the homes of skilled wage-earners in Vienna, consisting of a room and kitchen, which were occupied by families of as many as nine persons. There are multitudes of wage-earners who occupy but one room for self and family.

WAGE-EARNER'S DIET.

The wage-earner's diet, as a rule, consists of bread, vegetables, and coffee, and if his family is not too large, of scrap meat for Sunday dinner.

SICKNESS AND OLD AGE PENSIONS.

He enjoys, however, this advantage over the average American workman. In the event of sickness he is furnished by the State with free medical treatment and free medicine, and also an amount from the state sick fund, equivalent to sixty per cent of his annual wages, to which his employer has contributed one third and he has contributed two thirds. This allowance is given him for a period of twenty weeks. In the event of a disabling accident, he likewise receives a State allowance equivalent to sixty per cent of his annual earnings, to which he has contributed ten per cent and his employer ninety per cent.

The question of old age pensions is also being agitated at this time, and the Austrian Parliament has such a measure now under advisement.

STRIKES.

The rapid increase in the ranks of union labor has tended to an increase in strikes. The official record for recent years stands as follows:

Number of strikes in 1902	246
Number of strikes in 1903	324
Number of strikes in 1904	414
Number of strikes in 1905	686
Number of strikes in 1906	1083

RECOGNITION OF UNIONS.

The great fight that is being made by Austrian labor is to obtain recognition at the hands of the employers. By virtue of its growing strength it has commanded recognition on the part of the smaller employers, which, as a rule, now recognize the labor unions. The larger employers, however, do not, as a rule, recognize labor organizations, and are uniting more and more with the view of collectively refusing to recognize union labor. Aside from the carpenters' union of Vienna, the "open shop," as a rule, prevails throughout Austria. Austrian labor unionism, it is claimed by its leaders, stands for temperance, for the intellectual development of the wage-earner, and for a faithful observance of labor contracts.

Wherever labor unionism is recognized, the tendency of employers and of unions is in the direction of making contracts running from three to five years. The labor federation insists upon the strict observance of these contracts on the part of unionists, a clause being generally inserted in such contracts to the effect that the federation agrees to withhold support, financial and otherwise, from any union that violates its contract, and, if need be, to expel such union from the federation.

The labor unions in Austria, as in America, are opposed to the unions

incorporating, on the ground that to become legal bodies would lay them open to becoming perpetual victims of legal proceedings instituted by the Employers' Association with the view of disrupting the labor organizations.

In order to prevent the selfish among the labor leaders from needlessly prolonging strikes in their own interests and at the cost of capital and labor, and in order also to prevent the union members from being terrorized by radical unionists, the rule is faithfully followed during a prolonged strike of taking a weekly secret ballot on the question, "Shall the strike be continued?"

EFFICIENCY OF AUSTRIAN LABOR.

Austrian government officials, who have carefully studied the Austrian wage-earner, confess that the same man when transplanted to American soil becomes much more efficient. In this connection Dr. Alfred Grünberger, connected with the Ministerial Department of Trade, made the interesting statement that shortly after the recent panic struck the United States, news came that thousands of Austrian wage-earners were on their way back to Austria. This information caused great uneasiness, and committees were hastily formed and employment offices organized in order better to deal with what was expected to be a horde of returning suffering refugees. The surprise of the committees was great when they found the women among the returning emigrants decked out in fashionable garments, with hats decorated with ostrich plumes reaching high up in the air, the men, as a rule, wearing creased trousers, and all of them wearing an astonishing air of prosperity. They were further surprised when the offered employment at eighty or ninety cents a day was laughed at by the returning wanderers, who informed the committees that they had plenty of money, that they were not seeking employment, and that they had simply availed themselves of the slack time to take a junketing trip home where they intended to remain until there was a revival of American trade, when they proposed to return to the United States. I was further informed that there is not one case on record where employment was accepted at the wages offered.

The increased effort and energy of the Austrian workmen when transplanted to American soil is ascribed largely to the better general social and economic conditions that prevail in America, because of its boundless resources, the higher esteem in which labor is held, the far greater opportunities and possibility of advancement, and the progressive spirit of the American employer, who is ever ready to discard old methods and introduce the most modern methods obtainable.

STATE INTERVENTION IN LABOR DISPUTES.

While the State has made no legal provision to deal with strikes and lockouts, it often happens that officials holding high places take the initiative of bringing the conflicting parties in labor disputes together for the purpose of conciliation. One such official, Government Councillor Ritter von Heutl, a particularly tactful official of the province of Lower Austria, has in this wise been the means of settling successfully forty labor disputes, averting that many strikes and lockouts.

This method has grown into such favor that the conflicting parties now frequently appeal to such mediators to arbitrate existing differences.

COMPULSORY ARBITRATION.

Of the many who were invited to express an opinion as to the wisdom and practicability of compulsory arbitration, only three expressed favorable opinions, His Excellency Dr. Gessmann, Minister of Public Works; Herr Frederick Elsinger, a prominent manufacturer, and Stadthalter von Heutl. The latter specially favors compulsory arbitration, expressing the belief that the activity of a court of compulsory arbitration and the precedents created by the same, might be instrumental in effecting and maintaining industrial peace.

On the other hand, however, I found that Austrian employers and employees, as a rule, are much opposed to compulsory arbitration. Austrian employers are opposed not only to compulsory arbitration, but to interference of any sort in labor disputes on the part of the State, on the grounds—

a. That the State officials are likely to be in sympathy with labor, and are likely to use their influence to get concessions in favor of labor, in order to least inconvenience themselves and in the interest of industrial peace.

b. Because compulsory arbitration in time of industrial disputes would compel the employer to expose in court his private affairs for the information of the court and at the same time also for the information of watchful competitors, while labor on the other hand would stand simply on its demands.

c. Because compulsory arbitration, the employers claim, would rob them of their liberty, and would compel them to accept the dictates of perhaps a hostile court.

Austrian labor is opposed to compulsory arbitration—

a. Because it fears that capital with its tremendous power would intimidate the arbitration courts; and

b. Because compulsory arbitration would rob labor of the right to strike, which it regards as its most formidable weapon, and which it will not surrender under any conditions.

Labor declares further by its representative, Hueber Broun, editor of the *Arbeiter Zeitung,* the Social Democratic paper of Vienna, and Representatives Beer, Hannsch, and Schrammel, members of the Lower Austrian House, that it would combat any attempt to deprive it by law of the power to strike and would employ all means at its command, resorting, if necessary, to the extreme of fighting therefor in the very streets.

Professor Kobatsch, a recognized authority on economic and labor questions of Austria, maintains that compulsory arbitration can not be adapted to the economic and social conditions of Continental Europe, and that even in England, the most progressive industrial country of Europe, the proposal was recently rejected with the enormous majority of 660,000 votes.

STRIKE REMEDIES.

The consensus of opinion in Austria on the part of officials, employers, and labor leaders is that the best remedies against strikes and lockouts are—

a. Organizations on both sides, as powerful as they can be made, on the theory that mutually strong organizations with the power to inflict, if need be, great punishment on the opposing side, will tend to greater mutual respect and to greater mutual restraint.

b. On the part of labor leaders, it is held that the recognition of labor unions and collective bargaining makes for greater industrial peace.

c. The bringing together of the conflicting parties for the purpose of reaching a better mutual understanding.

d. The making of long contracts, say from three to five years, between employers and employees in order to establish a condition of steadiness and to enable employers safely to plan for the growth and development of their business.

The feeling seems to be growing in Austria, especially in labor circles, that more is to be gained by peaceful measures in labor disputes than by strikes and lockouts, and the present labor tendency is to leave nothing undone to maintain peace before the extreme measure is resorted to of declaring a strike.

GERMANY.

Germany in the past two or more decades has made tremendous industrial strides. Since the introduction of technical schools some twenty years ago, and coincident with the introduction of a State protective trade policy and a more paternal State interest in the welfare of its working people, Germany has grown to be the greatest Continental industrial producer and a keen and steadily growing competitor to Great Britain in the markets of the world.

By virtue of the splendid training the German workman receives in his elementary and technical schools, to say nothing of the discipline he undergoes in his three years' compulsory army service, his standard of efficiency has been materially raised and he makes a far more capable and intelligent workman than did his father or his grandfather. These qualities, together with the fact that though all German workmen drink beer, and some of them consume a great deal of it, few, if any, get drunk, and from the further fact that few, if any, German workmen are addicted to the vice of gambling, enable him, despite his comparatively small earnings, to show a good bank account.

CONDITION OF GERMAN WAGE-EARNERS.

While the average earnings of the German workman are not more than half the earnings of the wage-earner in the United States, there is a marked absence of the extreme poverty that greets the eye in British or American cities. There are no slums to be found in the cities of Germany. Nor are there to be found city districts where are to be seen the so-called submerged tenth. Even the poorest quarters of the German cities are kept scrupulously clean, the tenements outwardly present an attractive appearance, and inwardly, as a rule, will bear a searchlight inspection. This is not only due to the absence of drunkenness on the part of the wage-worker, but also to the deep and sincere interest manifested on the part of the authorities in the physical well being of the working classes.

EFFICIENCY OF GERMAN PUBLIC OFFICIALS.

Unlike our American cities, burgomeisters (mayors) and city officials are specially trained for their work and render the highest quality of efficiency. Moreover, such a thing as municipal graft is unknown in Germany.

The Germans can not understand what seems to them a paradoxical condition in our country. They ask, "How is it that individually you Americans, as a rule, are the soul of honor, yet collectively in your municipal administrations you seem to be a pack of thieves?"

In consequence of the efficiency of the German municipal officials and the absence of municipal graft, Germany has the best governed and the best kept cities in the world. The German taxpayer, as a rule, gets a hundred cents worth on the dollar in municipal service and in municipal conditions, as illustrated in a measure by the following statement taken from a recent issue of the *Berliner Lokal-Anzeiger*:

At a sitting of the Berlin municipal council held on Friday, Dr. Steiniger, the city chamberlain, announced that the financial year had closed with the substantial surplus of ten and a half million marks.

Direct taxation has brought 4,300,000 marks more than the estimates. Economies and increased revenue from the City Loan Department realized 1,500,000 marks. The carrying out of public works had been accomplished for 2,500,000 marks less than had been anticipated.

There are yet other reasons why, despite the fact that the average earnings of the unskilled workman do not exceed $5.50 per week and the skilled workman $7.00 per week the year round, that he can, as a rule, keep a savings bank account.

A German workman occupies for himself and family but one room and kitchen for which he pays a rental of about $6.00 a month, which is less than half the rental paid, as a rule, by the workman in our American cities. His wife is often also a breadwinner, and if his children are over fourteen, they likewise as breadwinners add to the family income. In addition to all this, the paternal form of government exercised by Germany makes provision for the care of the wage-earner and his family in the event of sickness, permanent infirmity, accident or old age.

GOVERNMENTAL PATERNALISM.

Perhaps the greatest of all the great achievements of Bismarck was the founding of the sick, the accident and the old age pension funds which he initiated. One reason why so few beggars are to be seen in Germany is because the sick and the old are well cared for. And this is done in a way not to destroy the self-respect of the man. He is in no way pauperized by being given what may be termed uncharitable charity. He himself must contribute in the days of his health and strength to the creation of a fund that in the days of sickness and old age will place him beyond the need of charity, and insure him the best medical treatment for his physical ailments and a roof over his head when his days of physical usefulness are over. All this is accomplished at so trifling a tax upon him that he scarcely feels it. The lowest paid wage-earner contributes to this fund less than two cents a week and

the highest paid wage-earner pays a little less than five cents a week. Equivalent amounts are also paid into the fund by the employers as their contribution to the sick and pension fund for employees.

These trifling payments afford an annual income for the city of Berlin alone, to say nothing of the rest of the empire, of $2,500,000, not including a further income of about $500,000 interest on the reserve fund of $18,500,000 which has been accumulated since its creation. The reserve sick and pension fund for Germany as a whole is over $375,000,000, and the fund is scarcely more than eighteen years old.

Out of such funds have been erected for the exclusive use of workingmen, some of the finest sanatoriums in the world. In fact, the sanatorium for the workingmen of Berlin, located in a magnificent forest about an hour's ride from the city, is regarded as the finest in the world, and accommodates twelve hundred patients. The German workingman feels that these sanatoriums are his, built partly with his own contributions, and that it can no longer be said that only the rich can enjoy the comforts and the blessings afforded by these modern institutions for the sick. In addition to being cared for at these superb sanatoriums where the highest medical skill is employed, the family of the sick workman, as long as he is an indoor patient, is assisted out of the insurance fund, in amounts, according to the contribution that he has made to the imperial insurance fund, equivalent to from one quarter to three quarters of his full wages. In the city of Berlin alone there are five hundred thousand persons who contribute to the imperial insurance fund. Berlin alone now has over two thousand workers over seventy years of age who are in receipt of old age pensions and about twenty-five thousand persons who receive infirmity pensions.

The total number of workers insured in the German empire as far back as 1903 was 10,914,333.

The apprehension that the sick and old age pensions in Germany would paralyze the spirit of thrift, predicted by those who in the beginning opposed the measure, has not been realized, as shown, for example, by the colossal increase in the German savings banks deposits from 1894 to 1904. In 1894 the savings deposits in Germany were $980,556,375. In 1904 they were $1,902,436,560, nearly double.

As pointed out by a recent writer:

> It is held in Germany that the state does not exist merely to afford protection to the better situated, but also to watch over and to administer to the requirements of the working classes. The first step taken was to ward off the weight of the consequences accruing from accidents and sickness, and the result of the labor in this direction was the passing of the workman's sickness insurance and the workman's accident insurance bills.
>
> The German government is unceasingly occupied with the problem of providing for the comfort and well being of the sixty million Germans now living in Germany and is not leaving to succeeding generations unaided, the task of continuing the solution of this problem.

In addition to the provisions made by the government for the well-being of its working people, many employers voluntarily coöperate. They not only pay into the state insurance funds the amounts required by law, but many, especially among the large employers, have private pension funds, and have erected model workingmen's dwelling houses, workingmen's free libraries and bathing houses. Thus, do we find the State, the employers, and the employees coöperating together for further industrial progress and advancement.

While the provisions against sickness and old age have in nowise lessened disputes between capital and labor, they have nevertheless bettered the conditions of wage-earners and insured them in case of old age, sickness, or misfortune from becoming objects of charity.

On the other hand, as stated in his recent report by American Consul Harris of Chemnitz:

> Experience has shown in Germany as elsewhere, that the more the manufacturer learns to differentiate between a man and a machine, the more he is likely to reduce the danger of strikes.

In her sincere interest in the welfare of the working people, Germany has given the world a great object lesson by which others nations are sure to profit. Austria now has under advisement an old age pension act, and the latest advices from England tell that Parliament has just passed an old age pension bill.

I venture the prediction that the day is not far distant when the United States will likewise see the wisdom of insuring its work people against sickness and old age, thus minimizing much misery and suffering, to say nothing of saving the great waste ever going on in the way of duplicated and mismanaged private American charities supported for the relief of the sick and the old.

The possible argument that we do not want paternalism in our government will in my opinion not hold in this connection, for the reason that, in a measure, we are already paternalistic, as evidenced by our free dispensaries and free county hospitals, which, however, tend to pauperize because they are conducted in the nature of public charities. The compulsory contributions made by German employers and employees removes the thought in Germany that the recipient is an object of charity.

WAGES AND COST OF LIVING.

As elsewhere in Europe, the tendency of German wages in recent years has been upward until checked by the recent depression, which has been keenly felt in the industries of Germany. The cost of living, however, has also progressively increased, but not as much as the rise in wages.

LABOR ORGANIZATIONS.

Organization has gone forward with rapid strides in recent years among employers as well as among employees. The organization which corresponds with the American Federation of Labor now numbers 1,888,000 members, and is still growing.

In common with the Austrian wage-earner the workingmen of Germany take an active interest in politics, and under the title of "Social Democrats" wield considerable political power.

Because of the fact that the government is anti-socialistic, and because of the further fact that the labor unions and the Social Democratic party are composed practically of the same membership, the government is not very friendly to labor unions. The government at times has shown its hostile spirit toward labor unionism, but thus far has not been able to cripple labor organizations by the passing of unfriendly legislation.

While many of the smaller employers, as well as the employers in the printing, bookbinding and building trades, have been compelled to recognize the unions, the great German employers of labor, including the employers in the coal, the metal and the textile industries, have steadily and persistently refused to deal with or to recognize unionism. Employers in these industries, with three million wage-earners on their aggregate pay rolls, are strongly organized and persistently refuse to deal with or to recognize labor organizations. They contend that union wage-earners, as a rule, are also members of the Social Democratic party, which has persistently and needlessly antagonized capital and capitalists, and that so long as this condition prevails they will refuse to recognize unionism. Exceptional cases are found where large employers will recognize unions composed of their own workmen. For example, Messrs. D. Peters & Co. of Elberfeld, manufacturers of woolen and cotton stuffs, have a council composed of nine employees, four of whom are nominated by the employers and five are elected by the workmen, with a member of the firm as president, who, however, has no vote. All differences arising in relation to hours of labor or wages are referred to this council, whose decisions have ever been accepted by both parties. This plan seems to have worked to the satisfaction of all concerned.

STATE INTERVENTION IN LABOR DISPUTES.

The State has thus far refrained from even attempting to exercise any coercion in forcing settlements in labor disputes. It is a strong believer, however, in the exercise of conciliatory measures. With this end in view a law went into effect in 1907, creating what has since become known as the arbitration courts for trade disputes. There are between four hundred and four hundred and fifty such courts throughout Ger-

many. The court in Berlin has eight departments with a judge for each department. These courts have three separate and distinct functions:

a. To decide disputes between individual workmen and their employers.

b. To conciliate in disputes between bodies of workers and their employers.

c. To give expert information and opinions, in reference to trade questions to legislators and to state executives.

Under the law the court awaits the registering of a complaint by either party to a trade dispute, but it also has the power to take the initiative and to summon both parties to a hearing, subject to a fine of twenty-five dollars for failure to respond to such summons.

There is no penalty for either side refusing to answer questions put by the court or for refusing to enter into negotiations with the other party, even at the instance of the court.

The theory of the law is that one half the battle in a labor dispute is won in the direction of peace if both parties can be brought together by a third party, who in this instance is the court, who is disinterested and in whom both sides can place confidence.

I was informed by Herr Gustav Melisch, Chief Secretary of the Industrial Court of Berlin, that seventy per cent of the disputes are submitted to this court and that as a rule the decisions rendered are accepted, although under the law there is no obligation to do so, but that most cases are settled by compromises effected between the parties in dispute, while the case is in course of investigation and prior to the court decision.

Herr Melisch made the further statement that mutual deference and respect is shown in the discussions of labor questions before the court between the representatives of employers and employed, and that the labor contracts frequently resulting from these court investigations, some of them for a period of three to five years, are mutually respected.

STANDING OF GERMAN LABOR LEADERS.

Herr Melisch took occasion to speak in high terms of the German labor leaders with whom his official duties have brought him into contact. He spoke of them as being men of the highest integrity and character, and as being universally respected even by large employers whose policy it is not officially to recognize them.

ATTITUDE OF EMPLOYERS TOWARD STATE INTERVENTION.

The large employers of labor as a rule will not recognize this court of arbitration and conciliation, and its labors generally have been thus confined almost wholly to minor employers and to individual cases. An exceptional case happened recently, however, which was in the nature of a great stroke of good work on the part of the court. A national strike in

the building trades was threatened throughout Germany. Through the efforts of this court a hearing was held at which representative building contractors and wage-earners from various parts of Germany were present. The conference continued for many days, and finally, through the good offices of the court, mutual concessions were made and an agreement for a period of years entered into, which insures industrial peace in the building trades for a long time to come.

OPEN SHOP.

Excepting in the printing trades, the open shop prevails throughout Germany, though in many shops where the great majority are union workers it is said that life by them is made a burden to the nonunion worker.

COMPULSORY ARBITRATION.

I find that in Germany, as in Austria, employers and employees, as a rule, are opposed to compulsory arbitration. Official Germany seems likewise opposed to compulsory arbitration.

Herr Delbruck, Minister of Commerce and Labor, made the statement that the State does not favor compulsory arbitration for fear that it might find itself unable to enforce its decisions, and that a failure to do so would bring the administration into contempt.

German labor leaders are opposed to compulsory arbitration on the grounds that they feel that the State is not in sympathy with labor unionism, and that therefore the leanings of a compulsory court would most likely be toward the interests of the employers.

Nor are labor leaders here in favor of labor unions becoming incorporated for fear of being legally harassed by employers' associations.

German employers, as a rule, oppose compulsory arbitration because they want the State to keep hands off from their disputes with labor, believing as they do that in the end they can get better results and secure better terms for themselves without State interference.

CHAMBERS OF LABOR.

His Excellency Delbrück, the Minister of Commerce, stated that the draft of a law is under consideration regarding so-called "Chambers of Labor." These chambers of labor are to serve as courts of arbitration wherever special arbitration courts for trade disputes do not exist, or if the employers and employees are engaged in the districts of several existing arbitration courts, or if no agreement can be reached concerning a dispute in the ordinary court for trade disputes.

The composition for the proposed labor councils, their functions and powers, have not yet been fully determined upon, beyond the general idea that they are to be composed partly of employers and partly of employees.

TAXES.

By permission of American Vice-Consul General Charles A. Risdorf of Frankfurt, Germany, I include the following statement in this report as showing the burden of taxes imposed by the several countries named therein on their respective consumers:

FOOD TAXATION IN THE UNITED KINGDOM, FRANCE, GERMANY, AND THE UNITED STATES.

In view of the various projects of taxation in Germany, an essay with the above title by S. Rosenbaum seems worthy of interest. The author examined into the duties on groceries, sugar, tobacco and food of all kinds and the internal taxation on liquors, tobacco and food in the several states, and comes to the following results:

The burden of taxation is shown in the following schedule, the figures meaning dollars per capita of the population—

	United Kingdom.	France.	Germany.	United States.
1870	$6 35	$3 60	------	$4 55
1875	6 55	5 01	$1 45	3 59
1880	5 92	5 60	1 79	3 54
1885	6 07	5 59	2 58	3 40
1890	5 92	5 97	3 40	3 74
1895	6 02	6 22	3 01	2 77
1900	6 85	6 50	3 54	4 61
1903	7 82	6 22	3 54	4 28
1906	7 29	6 17	3 79	4 27

This table, covering a period of thirty-six years, shows interesting details. Thus, in America, the burden of taxation has *decreased;* the Americans now pay less per capita than in the year 1870. The development in England is quite similar, but it has been disturbed by the financial effects of the war in Transvaal. Even so the increase is moderate in this country of free trade.

Quite different results are shown in France and Germany, where the military preparations have been multiplied since 1871. In France this taxation has increased about one hundred per cent, and in Germany also there is a rapid rise. These figures form a good argument for the friends of peace.

The author also calculates the amount of taxes derived from food, liquors and tobacco in different countries.

	Food and Groceries.	Liquors.	Tobacco.
England	$1 58	$4 22	$1 50 per capita.
France	1 99	2 28	1 84 per capita.
Germany	2 38	1 07	34 per capita.
United States	83	2 58	87 per capita.

According to this schedule, the taxes on food are higher in Germany than in any other state. Still there is a fault in this calculation: only the revenue is taken into consideration and no allowance is made for the increase in prices of domestic products caused by high customhouse duties. The amount of duty collected for corn does not show the real burden of taxation resting on the population; the entire consumption of corn should be taken into consideration, and then we find quite different results in France and Germany, and even more benefit to England and America. It must also be borne in mind that Germany is a federal state, and that the states, countries, and communities frequently impose taxes on meat, beer, bread, etc., which are not included in this calculation.

BELGIUM.

Though one of the smallest nations in Europe, Belgium per capita is the greatest industrial country in the world. With a population of only seven millions, it does a foreign import and export business aggregating $14,000,000,000. Its industrial army numbers 1,500,000 souls, and is steadily growing. Over sixty per cent of all its manual workers are engaged in industrial pursuits, which are the main support of the nation.

Unlike the German and Austrian workers, strong drink has a grip on the wage-earner of Belgium. As a consequence, slums are to be found in its larger industrial centers, more especially in Brussels, where the lower order of wage-earners are more or less dissolute and thriftless. Many parents among them spend their week's earnings in drink and permit their children to go neglected and uncared for.

There is also much illegitimacy among this element of the population. The interesting feature in this connection, however, lies in the fact that as a rule these children are later legitimatized by marriage.

The Belgium nation is composed partly of French and partly of Flemish. A goodly part of what is now known as Belgium came under the dominion of Holland and the remainder under France prior to 1830, when the kingdom was brought into independent existence.

The Flemish wage-earners are hardworking, but stolid and obstinate; fully half of them are illiterate and largely governed by the priesthood. The French workman, who represents nearly two thirds of the industrial force of Belgium, on the other hand is exceedingly bright and clever.

LABOR UNIONS.

The Belgium labor unions have, many of them, established for themselves the reputation of being contract breakers. This has done much to destroy the confidence of employers in them and has greatly added to the normal difficulty usually experienced by labor unions the world over, in getting recognition from employers.

Labor leaders in Belgium have become awake to this fact, and some of the central labor organizations have adopted the German system of withholding support from such local unions as violate their contracts with employers.

WAGES.

The general tendency of wages has been upwards. For example, the increase in wages of textile workers has been about twenty per cent. In the iron trades the increase in wages during the past ten years has been from thirty to forty per cent. Despite all this, the wage standard of Belgium is lower than that of most other European industrial countries. To illustrate this, in Brussels, where wages, generally, are the highest in Belgium, skilled workers, as a rule, earn an average of eighty cents a day, and unskilled workers an average of sixty cents a day.

In the iron industries the rate is somewhat higher, skilled workmen averaging ninety cents a day, and unskilled seventy cents a day.

Street car employees in Brussels earn a minimum of sixty-five cents a day, and after several years' service a maximum of ninety cents a day, with a small pension after twenty years' service.

Saleswomen employed in the great coöperative department store of Brussels, which claims to pay higher wages than its noncoöperative competitors, earn at the start $1.50 a week and after three months' service $2.25 a week, with an increase of $2.50 a month for every two years' additional service until a maximum wage is reached of $6.70 a week; this, after a service of fourteen years.

A male head of department in this same enterprise, which position carries with it much responsibility and demands years of training, earns about $11.00 a week.

Despite the advance in Belgium wages during the past several years, the wage standard of Belgium is lower than that of France and other European countries. I was informed by a manufacturer who has a large *plant* in Belgium and one also in France, that his Belgium wage rate was thirty-five to forty per cent lower than that paid by him in France.

Belgian employers successfully fight foreign competition with low wages. Collective wage bargaining is rarely met with in Belgium. Aside from the building trades, where a minimum wage is fixed by the trade, the bargaining between employer and employee, as a rule, is individual.

COST OF LIVING.

The cost of living during the past several years has steadily been upward. The consensus of opinion among those who have made investigations along these lines is that the increased cost of living is fully twenty-five per cent. Nevertheless, it is maintained that food products are cheaper than in France or elsewhere on the Continent, due to the fact that, aside from customs' duties placed on a few luxuries, Belgium is practically a free trade country.

GROWTH OF UNIONISM.

Labor unionism presents a steady and constant growth. Organized labor now has a membership of about 300,000.

Some of the industries are better organized than others. The best organized industries are the building trades, the textile industries, and the iron workers.

Belgian union labor is divided into two main camps, the Socialists and the Christian Labor party. The former represents about ninety per cent of organized labor, and the latter about ten per cent.

To quote the statement made by the secretary of the Christian Labor party: "The socialistic labor unions stand for anti-capitalism, collectivism and aggressiveness in dealing with employers; the Christian Labor party stands for individualism, conciliation and arbitration in labor disputes."

The Christian Labor party is five years old, and now numbers between thirty and forty thousand members. During that period, according to the statement of its secretary, it has had twelve labor disputes, all of which were settled by arbitration. It has yet to deal with its first strike.

The Socialist Labor members are commonly known as the "Reds" and the Christian Labor members as the "Yellows." Many among the Socialists claim that the Christian Labor party is fathered by the Catholic Church and by the employers, both of whom are regarded by the Socialistic members as enemies to socialism.

The feeling between the "Reds" and the "Yellows" is more or less unfriendly, if not bitter. As a consequence, when "Reds" and "Yellows" are thrown together on the same job, there is friction. The "Reds" will work with the "Yellows" only when compelled to, and then, if they happen to be in the majority, things are often made most unpleasant for the "Yellows." While there are few, if any, employers who will recognize the "Reds," there are many who will recognize and deal with the "Yellows."

Though the latter represent but about ten per cent of the organized Belgian labor unionists, it is claimed by them that they are steadily growing in strength, and that in a few years they will outnumber the "Reds." The "Reds" seem to apprehend this and support a literary bureau for the express purpose of controverting the claims of their rivals.

Yet another marked difference in the policy of the two labor factions is that the "Reds" believe that the betterment of labor conditions must come largely through political effort. Much of their time and energy has therefore been devoted to political campaigning, and they now have a showing of seven members in the Upper House and thirty members out of one hundred and sixteen in the lower legislative body of the realm.

SUFFRAGE.

The "Reds" are making an heroic effort to have the existing law of suffrage changed, which provides for cumulative votes; that is, all males twenty-five years of age have one vote, if married they have two votes, and if also taxpayers they have three votes. This provision they contend militates against the wage-earner, and is in favor of the class who can afford to marry early in life and who have something on which to pay taxes. The "Reds" want the law of "one man, one vote," without further qualification. The "Yellows," on the contrary, are firmly opposed to mixing labor problems with politics, and steadfastly oppose such action on the part of their membership.

APPRENTICES.

As in the United States, the Belgium labor unions limit the number of apprentices to be admitted to any one trade. This policy it is claimed by President Carlier of the Brussels Children's Society has tended largely to increase juvenile criminality, which in Belgium, as elsewhere, is becoming a very grave problem. An effort is being made to meet this problem by the establishing of technical schools.

RELATION OF EMPLOYERS AND MEN.

The relations between employers and employees in various industries are getting more strained. Notable exceptions are the building and the iron trades where the relations are cordial. There has not been a strike in the iron trade for thirteen years.

EMPLOYERS' ASSOCIATIONS.

The Belgian employers have many and varied associations. These, as a rule, have for their main purpose the interchange of ideas on commercial questions. No systematic plan has as yet been adopted by them for defense against strikes, except in special cases, when temporary organization has been effected to meet particular cases. The idea of organizing to meet strikes is growing and will probably crystallize in the near future. Labor leaders express satisfaction at the thought of employers organizing for the purpose of defense measures against strikes, claiming that such action on the part of employers would afford stronger ground for appeal to labor to organize more widely.

OPEN SHOP.

Aside from the printing and diamond cutting trades, "open shop" prevails throughout Belgium, although in the glass industry it is claimed that nonunion workers are persecuted by unionists.

STRIKES.

During 1907 strikes were more frequent in Belgium than in previous years, but since the depression has set in, from which Belgium in common with other European countries is suffering, they are diminishing.

Unionists seem to hold a grievance against the government because of its policy to furnish troops in anticipation of a strike. It has been noted that the older and wealthier unions oppose strikes, while the younger and financially weak unions favor them.

It was interesting to get the views of various labor authorities as to the best remedy against strikes. Mr. Carlier, a large coal mine owner, and one of the most intelligent employers in Belgium, gave it as his opinion that the remedy lies in higher education of the wage-earner, and in legislative measures that will establish labor union responsibility for the protection of employers, and for the protection of such other wage-earners as are innocently injured by senseless and needless strikes. The secretary of the iron workers' union gave it as his opinion that the remedy for strikes lies in profit sharing. Minister of Labor Hubert expressed the opinion that withholding a part of the wages as a guarantee of good faith tends to diminish strikes, and pointed out that in the Belgium glass industry employers withhold one fifth of the wage with good results. The secretary of the Christian Labor party believes that arbitration is the missing link, and the editor of a leading Belgian socialistic paper expressed the opinion that collective contracts of from one to three years would tend to make strikes much more infrequent.

COMPULSORY ARBITRATION.

Nearly every one interviewed in Belgium seemed opposed to compulsory arbitration as a strike remedy, some going so far as to say that to take away from the wage-earner the right to strike, which would follow under compulsory arbitration, would lead to endless rioting if not to open rebellion.

Wage-earners opposed compulsory arbitration on the grounds that they could not hope for a fair deal at the hands of courts who, they believed, as a rule, are in sympathy with capitalistic employers; and employers opposed compulsory arbitration on the grounds that the State should keep its hands off labor disputes, and partly because they did not believe that the public would generally stand behind and support the court decisions, and partly because they did not believe that the court decisions could be enforced against a great body of workmen who, as a rule, would accept the decisions only if they happened to be in their favor. One exception to this point of view was Prof. Emile Waxweiler, Director of the Solway Institute of Sociology in Brussels, one of the greatest Belgian authorities on questions of this character.

He expressed the opinion that the only logical and ultimate remedy for strikes and lockouts is compulsory arbitration, and that it was only a matter of time when society would find itself obliged in self-defense to adopt this method in order to maintain industrial peace and to prevent the enormous economic losses, to say nothing of the physical suffering and misery to which countless innocent people are subjected by strikes and lockouts, many of which are the result of individual self-seeking or passion, or bad judgment, rather than a desire to obtain equity and justice for the many.

The organized wage-earners of Ghent who number about fifteen thousand, and who rank among the most intelligent workmen of Belgium, are another exception. This was the first organized labor body that I had met in all my travels through Europe which is in favor of compulsory arbitration. On mentioning this to the secretary, he answered that the Ghent wage-earners had for years carefully followed and studied the labor struggles of the British wage-earner, and they had noted that despite all the losses and all the sacrifices made on the part of the English workman in conducting his strikes, he was not much better off than he was in the beginning, and that the conclusion had been forced on the Ghent workman that on the whole the strike is not the way through which the wage-earner can hope to improve his condition, that the losses he suffers often more than offset his gains, and that labor disputes, like civil disputes, should be settled in a peaceful manner without needless loss to employer or employee. Existing conditions and general sentiment in Belgium make it very improbable that any attempt at legislation having compulsory arbitration for its end is likely to succeed. Professor Waxweiler and the Ghent labor unions in their views seem far in advance of the ideas of the rest of those in Belgium who are interested in labor problems. Some arbitration legislation is contemplated and is likely to be brought before the Belgian Parliament at an early day, but so far as I could learn, the proposed arbitration is to be purely voluntary in character, despite the fact that experience, the world over, has demonstrated that purely voluntary arbitration for the settlement of labor disputes has been a failure.

FRANCE.

The organization of labor in France is still in a very rudimentary condition. Sixty years ago, when trades unions in England were already free from legislative control, it was still an offense against common law for a handful of French workmen to take joint action with a view to obtaining better conditions from their employer; and it is only since 1884 that trades unions in France have been recognized. In some countries this might have been a sufficiently long period to permit of a fair amount of settling down; but the testimony of practically all the experts whom I have consulted shows that the conditions in France are peculiarly unfavorable to the efficient working of the machinery. The French workman's strong aversion to discipline and restraint tends, in the first place, to keep him outside of any organization, and the result is that the disciplined forces of labor represent only a small fraction of the great body of workers. Side by side with impatience of control there appears to be, in the French workman's character, a deep-rooted mistrust of those in authority, whether his own elected representatives or government officials. No real confidence is placed in any one man or small body of men. There are innumerable splits and dissensions, but there is little united action.

No other country in Europe faces so difficult a situation as does France in dealing with labor problems. This is due not only to the fact that politics and labor questions in France are hopelessly mixed, but also because of the peculiar temperament of the French employer and the French wage-earner.

The leading French labor leaders frankly admitted to me that the French workman is mercurial, excitable, impetuous, hasty, lacking in self-control, and, therefore, very hard to discipline. A most conservative and level-headed French labor leader said to me that the tendency of the French wage-earner is first to delegate power to his leaders, and then at the supreme moment to snatch it out of their hands. This peculiar temperament leads to many reckless and ill-advised strikes.

The attitude and the temperament as a rule of the French employer also adds no little to the difficulty of the situation. A leading authority on the question, says, "French employers and employees, as a rule, don't know each other and don't trust each other. Employers, as a rule, are unwilling to discuss with workmen, and workmen are unwilling to respect arrangments made in their name."

The result under these circumstances can not be otherwise than very strained relations between employers and their workmen.

SOCIALISM.

The labor question in France is hopelessly entangled with socialism, and socialism in that country stands for political action.

At the last general French election the Socialists cast 896,000 votes and they have to-day seventy-six representatives out of five hundred and eighty-four members of the lower house. This has brought about a tendency on the part of the French workman to devote his energies to politics rather than to economic unionism, and this in turn has led to much disappointment on the part of many socialistic wage-earners who expected much in the way of a betterment in their material conditions as the result of political action, and who now advocate the direct and sudden strike instead of looking for relief to politics. This strong leaning in the direction of the strike is encouraged by the anarchistic elements among the Socialists and the unionists.

WAGES.

The tendency of wages in France since 1906 has been upward in the printing and building trades, and either stationary or downward in all the other trades.

The average wage for an unskilled workman in Paris is eighty to ninety cents a day and for skilled labor from $1.60 to $2.00 a day. The average wage for all of France in the printing trades is ninety cents a day. The building trades pay sixteen to eighteen cents an hour, with ten hours work a day in summer, and about one hundred and ten hours work a month in winter. Pick and shovel men earn from 75 cents to $1.10 a day in the provinces. In Paris, owing to the extraordinary demand caused by the building of the subway, these workers have been receiving from $1.25 to $1.50 a day. Paris wages, however, are not a guide for the wages in France.

The secretary of the Labor Federation made the statement that in the making of clay pipes, for example, at Omar, a town about one hundred and twenty miles from Paris, a team of three, consisting of a man, woman and boy, will earn collectively but $5.60 a week, with a working day of twelve hours. A strike is now on in this industry for an increase in wages for the team of five cents a day. He also stated that women are employed in the provinces in making watch chains, for example, for which they receive twenty-five cents a day, while the same sort of work in Paris commands a wage of $1.50 a day.

HOURS OF LABOR.

The legal working day in France is twelve hours, though the iron workers have a ten-hour day, and the printing trades as the result of a national strike in 1906 have a nine-hour day.

COST OF LIVING.

All sides agree that the cost of living in France has increased materially, some authorities placing the increase at from ten to fifteen per cent, and some putting it as high as from twenty-five to thirty per cent. Figures published during my sojourn in Paris by the Assistance Publique, or Poor-Law Department, which manages the public hospitals and is consequently a very large buyer of all kinds of food supplies, show that the cost of living for foodstuffs has increased by eighteen per cent during the last four years.

LABOR UNIONS.

The situation in France of labor unions is unlike that of any other country in Europe. The governmental attitude toward labor unions seems eccentric and illogical. To illustrate: On the one hand we find the municipality of Paris, so far back as 1891, erecting a splendid and costly labor temple, which has since been occupied by two hundred and fifty labor unions, not only free to them of all expense, but with an annual subsidy of $22,000 for the conduct of a free labor bureau. This would indicate that the political authorities are in sympathy with organized labor, and desire to aid and encourage it. On the other hand, however, labor unions are not permitted under the law to own property. The only explanation offered for this strange attitude is that the authorities fear that the ownership of property would give too much strength and power to the unions.

The absurdity of this provision seems to have forced itself on the attention of legislators, some of whom are now endeavoring to have this law repealed, but strange to say, labor unionists, as a rule, do not want the law changed. They prefer that unions shall not own property in order to remain legally irresponsible.

It is difficult to get reliable information about the actual strength of labor unions in France. The government depends for its information upon the unions, who in recent years have adopted the policy of either withholding or giving misleading information in order to hide their real strength. However, from statements made to me by labor union secretaries, it is safe to say that there are from 800,000 to 900,000 organized wage-earners in France, out of which number there are, perhaps, 500,000 in the General Federation of Labor.

The increase in the membership of the General Federation of Labor for this year of 140,000 has been unusually large, due to the fact that 50,000 coal miners enrolled themselves as members. Even the opponents of unionism in France concede that it is growing, but some of them maintain that such growth is not so rapid as in other countries.

The labor unionists in France are far more revolutionary than those of Germany or Italy, and their more recent aggressive methods in

endeavoring to obtain favorable labor legislation and to enforce their demands upon employers, have at times led to serious riots, all of which have tended to antagonize public sentiment and to create a growing hostility toward organized labor.

The claim is made by employers that French labor leaders strive to foment trouble by frightening employers and by dominating labor. The further claim is made by employers that there are those among the "Reds" (the Socialists) who are constantly preaching to wage-earners that they should diminish their output—

a. Because they say that a small wage deserves only a small effort.

b. To make work for more hands.

c. In order to cripple and ultimately destroy capitalistic industries, and thus sooner pave the way for socialism.

As a rule, employers do not recognize the labor unions and persistently refuse to deal, or to discuss matters with their representatives.

EMPLOYERS' ASSOCIATIONS.

During the past three years there has been a very pronounced movement on the part of employers to organize in order collectively to meet strikes. Several mutual strike insurance associations have been organized among employers. One of these associations within two years has accumulated a strike fund of $3,000,000, and another association carries strike risks of over $7,000,000. When an employer has a strike he is allowed, during the life of the strike, a daily amount to cover his operating expenses, minus the pay roll of the strikers.

It is claimed that the organization of employers and the existence of the strike insurance fund have had an important influence in restraining what would otherwise have been many reckless and unwarranted strikes.

CLOSED SHOP.

The "closed" shop, that is, the shop where union workmen exclusively are employed, is hardly known in France. Every shop, as a rule, is "open," and the employer engages union or nonunion help at his pleasure.

PIECEWORK.

Piecework has been introduced in more recent years with seeming success. The managing director of one of the largest iron works in France made the statement that he had adopted the piecework system with the result of an increased labor efficiency of fully thirty-three per cent.

COLLECTIVE BARGAINING.

Individual bargaining between employer and employee seems to be the rule in France. Collective bargaining has as yet made little progress, and by many employers is regarded as impracticable in France, due for one reason to the fact that under the law labor unions

are forbidden to own property, thus destroying their financial responsibility. The printing trades are an exception to this rule. In 1906 they entered into a five years' collective contract with their employers, which thus far has been faithfully observed.

STRIKES.

Strikes in France have steadily increased. Mons. Calliard in his report to the Labor Committee of the Chamber of Deputies, December 27, 1907, calls attention to the following comparative facts:

	No. of Strikes.	No. of Establishments.	No. of Strikers.
1897	356	2,568	68,875
1907	1,275	8,364	197,894

Before 1899 the average yearly strikes in France were 438, involving 79,000 strikers. From 1899 to 1906 the average yearly strikes numbered 801, involving 192,000 strikers.

He (Mons. Calliard) makes the statement that one explanation for this increase in the number of strikes is the fact that the anarchistic elements among the wage-earners have largely joined the labor unions since 1899. This element regards the strike as the chief means of education toward political revolution. While not disdaining partial strikes they prefer general strikes as conducive to more speedily bringing on a general revolution.

The Anarchists, Calliard goes on to point out, use economic questions as pretexts for strikes, their main purpose being political revolution. He calls attention to the fact that through the agitation of the anarchistic element among the labor unionists, a general strike throughout France was declared for an eight-hour day on May 1, 1906; 295 strikes took place on that day involving 202,507 workers and causing a loss of 3,507,033 days of labor, with disastrous results to labor and to many of their unions.

Another cause for strikes is the attitude of the French employer who, as a rule, follows the policy of treating labor aggressively instead of in a conciliatory manner. Yet another cause for the excessive number of strikes is the lack of any restraining influence on local labor unions.

In the United States, as a rule, a local union can not declare a strike without the approval of the central body. This has been found to be a powerful restraining influence on the hotheads of local organizations. In France, as a rule, a majority of those present at a meeting can declare a strike without reference to the central body, which, however, is obliged to support the strike, even though the strike in its judgment may have been ill advised and unwarranted.

In the electrical labor union the conditions are even more radical, the power to declare a strike being placed in the hands of a secret committee of three, who are supreme in the matter, and whose orders must be obeyed.

These methods lead to numerous strikes being declared as a result of passion rather than reflection, and in a measure explain why so many strikes in France fail, as is shown, for example, by the following report for the month of April, 1908, the latest available record:

Strikes won	12
Strikes compromised	36
Strikes lost	51
Total number of strikes	99

It is interesting to note the remedy for this condition offered by some of the different parties in interest. The remedy suggested by one prominent labor leader was that employers should modify their harsh attitude toward employees. The remedy suggested by one employer was that all employers should refuse to deal with any but their own employees.

Yet another employer stated that what he had found to be an efficient remedy was to divide his workers into logical groups and to ask each group to appoint delegates with whom he was ready and willing to deal, and who were to be the only parties he would recognize.

ARBITRATION.

Arbitration, voluntary or compulsory, has comparatively few advocates among French employers or employees. The French employer does not take kindly, as a rule, to the idea of arbitration because this involves the acknowledgment on his part that labor has a right to a voice in determining wages and hours of labor. It seems most difficult for the French employer, as a rule, to bring himself into a frame of mind that will concede this right.

Wage-earners seem to be averse to arbitration on the theory that the arbitrator with whom would rest the final decision in labor disputes, would be apt to belong to the class in sympathy with employers, and hence the wage-earner would not be likely to get a square deal.

The unfavorable attitude of both sides to arbitration is emphasized by the fact that in 1892 a law was enacted which provides that in labor disputes the local magistrate may intervene as a conciliator and arbitrator. The law, however, has remained practically a dead letter as neither side has, as a rule, availed itself of this medium for the peaceful settlement of their differences.

The marked difference between the attitude of American labor unionists and French labor unionists in labor disputes lies in the American policy of resorting to the strike only after every effort for conciliation and arbitration has failed, and the French policy of using the strike as an immediate resort if the employer refuses promptly to grant the concessions demanded.

Employers and labor unionists in France are a unit in their opposition to compulsory arbitration in the settlement of labor disputes. Labor

is opposed to it because it claims it would rob it of the right to strike, which it regards as its chief weapon of defense. Employers are opposed to it because they resent any interference in labor disputes on the part of the State, and because, as was pointed out by the editor of the *Labor Record,* published by the Ministry of Labor, a judge in deciding civil cases is aided by the law, whereas, in cases of arbitration, he has no such guide, and hence it is almost impossible for the arbitrator to render equitable decisions.

Despite the pronounced opposition to State intervention in labor disputes on the part of employers and wage-earners, strikes are growing so numerous and so threatening in their revolutionary character in France that the political party in power contemplates introducing a bill at the next session of Deputies having a mild species of compulsory arbitration in view. This measure is known as M. Millerand's bill for the amicable settlement of disputes regarding labor conditions.

The bill provides that where the employer does not accede to the demands of the workers, the latter shall state their claims in writing. The employer shall within forty-eight hours send a written reply giving the names of the arbitrators he selects. Failing in this, the wage-earners may legally declare a strike.

If, on the other hand, the employer names arbitrators, the workmen in turn shall within forty-eight hours make known the names of the arbitrators chosen by them. If the decision of the arbitrators be not made known within six days, the workmen may legally strike. No strike to be declared unless a secret ballot has been taken. A strike being declared, the labor council (which is a body consisting of representatives of employers and employees, previously elected by their respective sides) shall be called in to settle the dispute, and their finding shall rank as an arbitrator's award.

A failure to abide by the decision shall be penalized by the loss for a period of three years of the right to vote for, or to be elected as the representative of any labor body, or chamber of commerce, or commercial courts, or the superior labor council. In case of a second offense the loss shall be for six years.

The party in power, which is fathering this measure, having a majority in the house, it is believed that the bill will carry.

The fact, however, that while a penalty is provided for a failure to abide by the decision of the arbitrators, this penalty is so mild in character as likely to have little or no restraining influence, and the further fact that no penalty is provided for a failure on the part of employers or employees to observe the initial steps in the proposed settlement of the dispute, would make it plain that the measure, should it become law, is likely to prove inefficient and ineffective.

ENGLAND.

One can not investigate the labor laws and labor conditions in England without soon discovering that British workmen and employers have long since passed through the stages now being experienced by both in other European countries. The fact is speedily forced on one's attention that most continental countries, in the matter of dealing with labor problems, are to-day where England was, say, forty years ago. The English wage-earner, as a rule, is far more amenable to reason than is his fellow-worker on the continent. While the English worker can not be driven, and, so long as he believes himself in the right, fights with a bulldog tenacity, yet when his reason is appealed to and the right way pointed out, he is, as a rule, easily led by those in whom he has confidence.

LIVING CONDITIONS OF BRITISH WORKMEN.

The conditions under which the British workman, as a rule, lives are better than are the conditions generally under which the continental worker lives. The English policy of free trade means cheap and abundant food for its people, due to the fact that the food producers of every clime are in constant competition with each other for the English trade. Most continental countries, on the other hand, having large agricultural interests, have deemed it essential to establish for their protection high tariffs against foreign foodstuffs, thus enhancing the cost of living of their wage-earners.

While there are yet tens of thousands of British workmen, especially among the nonskilled, who live in congested and unsanitary districts in the large British cities, such as London, Glasgow, Liverpool, and Manchester, there are many other tens of thousands who are more comfortably housed than are the continental wage-earners. Even in thickly populated London miles upon miles of streets are lined with wage-earners' cottages where, at a reasonable rental, each one may live, with his family, under comfortable and sanitary conditions. Single cottages for wage-earners are almost unknown in the large continental cities where great numbers of workingmen are housed in tenements with but two, and rarely three, rooms to a family, however large the family may be.

LABOR UNIONS IN POLITICS.

Some fifteen years ago the tendency began on the part of British labor to enter politics as an independent political body. To-day the

wage-earners have fifty-seven representatives out of a membership in Parliament of six hundred and seventy. While these labor representatives differ radically on many political issues, yet when it comes to labor legislation, as a rule, they vote as a unit. Thus, often by holding the balance of power, they have been able to obtain much legislation in recent years favorable to labor. The most notable achievement along these lines was the passage by Parliament of the "Trades Disputes Act" of 1906, section four of which reads as follows: "An action against a trade union, whether of workmen or masters, or against any members or officials thereof on behalf of themselves and all other members of the trade union in respect to any tortious act alleged to have been committed by or on behalf of the trade union, shall not be entertained by any court." Mr. D. J. Shaneleton, labor member of Parliament, who was chiefly instrumental in passing this measure through Parliament, which absolutely exempts the funds of labor unions against court judgments, informed me that Parliament was persuaded to pass this law, radical as it is, because he had been able to prove to its satisfaction that employers were violating the statute against blacklisting. This measure was therefore enacted in order to give workmen a counter protection.

CHARACTER OF BRITISH LABOR LEADERS.

It is interesting to learn of the exceeding care exercised by the British labor unionist in the selection of his trade union officials and political representatives. Such a scene would have been impossible in England as was witnessed some years ago in the city of New York, when the notorious Sam Parks, the corrupt labor leader, convicted of taking bribes in consideration of his declaring strikes in order to injure rival contractors, immediately upon his release from prison was welcomed by many trade unionists as a hero and a martyr, chosen as marshal of the Labor Day parade and greeted en route by deafening cheers from labor admirers and labor sympathizers. Nor would it have been possible in England to elect for a second and a third term, to high public office, largely by labor votes, such a notorious scoundrel and bribetaker as Eugene Schmitz, the ex-mayor of San Francisco, or his coterie of bribetaking labor union board of supervisors, who, by their infamous and corrupt conduct, dragged the good name of organized labor through the gutters, and in the minds of many of their fellow citizens and in the minds of many in foreign lands, tended to establish an unfavorable opinion of American labor unions in general.

While at a gathering at which happened to be present a number of directors and also the general manager of one of England's largest railway lines, I had occasion to mention that I had just come from an interview with the secretary of the Amalgamated Railway Employees'

Union. All present commented upon the secretary's high character, fair-mindedness and spotless integrity. They said these things despite the fact, as they themselves explained, that at times they differed most radically with him on the questions of wages, hours of labor, etc.

Without exception the opinion of all the employers and officials whom I met while in England was to the effect that British labor leaders are tried men who, because they are honest and dependable, have the confidence of employers and workmen. Even opposing employers freely admitted that British labor leaders have developed into able diplomats and business men of high order. In this connection ex-Prime Minister, A. J. Balfour, is quoted as saying: "Trade disputes in England have been carried on with a wisdom and moderation on both sides which can not be paralleled by any other industrial community. Surely it must be admitted that these admirable results are in no small degree due to the statesmanship, the moderation and the wisdom which have, on the whole, guided the leaders of the trades unions in dealing with the difficult problems which must from time to time arise in industrial society."

Graft and grafters find no lodgment in British labor unions. This, together with the care and the good judgment exercised in the selection of honest and capable leaders, has won the esteem and the respect of the British public for the labor movement and has added much to its influence and usefulness.

WAGES IN GREAT BRITAIN.

The latest British government report shows that in 1906 and in 1907 wages increased in every group of trades, but that this upward tendency was arrested early in 1908.

According to the fifteenth report of the British Labor Department for 1907 the prevailing wages in England in various industries were as follows:

Compositors	$9.00 per week.
Bookbinders	$7.75 per week.
Bakers	$9.25 per week.
Dock laborers	16 cents per hour.
Street car conductors	10 cents per hour.
Street car motormen	$1.18 per day.
Laborers	$5.00 per week.
Painters	$6.75 per week.
Letter carriers	$4.50 to $7.50 per week, according to length of service.
Policemen	$8.50 per week.
Farm laborers	$4.00 to $5.00 per week.
Iron founders	$10.00 per week.
Carpenters	18 cents per hour.
Bricklayers	20 cents per hour.
Plumbers	20 cents per hour.
Plasterers	16 cents per hour.

(Fifty hours constitutes a week's work.)

According to the same report the sliding scale of wages which for years prevailed in some industries, notably in coal mining, is going out

of favor on the theory that wages should not be dependent on selling prices.

The depression of 1908 led to the cutting of wages in the iron, ship building and textile industries, and some railway lines have posted notices that a cut in wages is to go into effect on January 1, 1909.

COST OF LIVING IN ENGLAND.

The cost of living in England has increased in recent years, though not in so marked a degree as in other European countries. There has been an increase in wage-earners' rentals, estimated at from ten to twenty per cent, during the past two or three years, and, according to the latest government reports, issued by the board of trade, there has been the following percentage of changes in retail prices during the past ten years, of twenty-three principal articles of food in London:

1897	96.2 per cent.
1900	100.0 per cent.
1907	105.7 per cent.

The average increased cost in ten years was 9.87 per cent. The twenty-three articles are bread, flour, beef, mutton, pork, bacon, butter, eggs, milk, cheese, potatoes, currants, raisins, rice, tapioca, oatmeal, tea, coffee, cocoa, sugar, jam, treacle and molasses.

TRADE UNIONISM IN GREAT BRITAIN.

According to the statement of the secretary of the British Labor Federation there are 15,000,000 industrial workers in Great Britain, of whom 2,500,000 are unionized. It is claimed by trade union representatives that unionism is steadily growing in Great Britain.

Unlike on the continent there is no hostility in Great Britain toward labor unions and British employers, as a rule, recognize and deal with labor union representatives. The exceptions to this rule are occasional individual employers.

The consensus of opinion among British labor authorities is that the relations between British employers and their workmen are growing more cordial, due partly to the methods of conciliation which are steadily growing, and due, as maintained by others, to labor going into politics and thus being brought into closer contact with employers.

BRITISH EMPLOYERS' ASSOCIATION.

Employers' associations are said to be growing in Great Britain in greater ratio than workmen's associations. One of the prime purposes of such associations is to meet and deal with strikes. Strike insurance fraternities among British employers are now nearly fifteen years old.

Labor seems to look with satisfaction upon these employers' associa-

tions, since it takes away the employer's claim that he wants to deal with his men individually. It also obviates, it is claimed, unpleasant personalities. As a rule, the employers' associations secure the services of an attorney to act as secretary.

CLOSED SHOP.

The "closed shop," that is, the shop where only union workers are employed, prevails wholly among the engineers, the printing trades and the textile industry.

COLLECTIVE BARGAINING.

Again, unlike the conditions prevailing on the continent of Europe, collective bargaining is the common practice in Great Britain and generally prevails. Much value has been added to the practice of collective bargaining, and the making of contracts between employers and their workmen for extended periods, because of the fact that the British workman, as a rule, is not a contract breaker, and the employer knows that a contract once entered into with labor unionists, even if it should later prove to them disadvantageous, will, in all likelihood, be respected and kept.

THE UNEMPLOYED.

The depression of 1908 has led to a great army of unemployed. The problem has demanded the greatest judgment and statesmanship on the part of the administration. Extensive public improvements have been entered upon with the view of lessening so far as possible the consequent distress.

The General Federation Trade Union, in its report for 1906-1907, strongly urges, as a preventive for unemployment, the policy of regulating and shortening hours during slack times in order to minimize this evil.

STRIKES.

The most serious strikes in Great Britain in recent years, barring the cotton trouble in October, 1908, have been in the ship building trade.

Great Britain is the only country in Europe that I have investigated where strikes are on the decrease. As an illustration of the marked influence conciliation and arbitration in Great Britain are having in avoiding industrial strife, the following figures are quoted from the Government Report of 1907 on Strikes and Lockouts:

	Number of disputes.	Work people involved.	Duration of working days lost.
1897	864	230,267	10,345,523
1907	601	147,498	2,162,151

It will be noted that in the last ten years the number of disputes has diminished by 34.40 per cent, the number of workmen involved has been decreased by 36.03 per cent, and the number of working days

lost, which after all is the correct unit to be considered, has been reduced by 79.10 per cent. This is the most remarkable record of any country I have thus far investigated.

When the increase by leaps and bounds is considered of strikes and lockouts in most other important industrial countries of Europe, with their consequent enormous cost and accompanying misery and suffering imposed on armies of workers and their dependents, this British strike record is a most powerful argument in favor of the progressive methods pursued in Great Britain in recent years along the lines of conciliation and arbitration.

British labor authorities, gratified as they must be with the admirable showing made in the diminished number of strikes and lockouts in the last ten years, are, however, looking forward to the time when Great Britain may be able to point to a clean slate, and when not a single day's labor will have been lost because of a labor dispute.

STRIKE REMEDIES.

Various remedies were suggested for the further diminishing of British strikes and lockouts. Socialists, such as Kier Hardie, expressed to me the opinion that the final remedy is socialism, and that, pending the general acceptance of this remedy, relief lies in stronger organization on the part of labor. Other Socialists, such as Sydney Webb, believe that a most potent factor for the further diminishing of strikes and lockouts is for the State to intervene to the extent of fixing a minimum wage for every industry, less than which wage it should be a penal offense for the workmen to accept or for the employer to pay. The Right Honorable John Burns, labor leader and Cabinet Minister, said to me that in his opinion the remedy lies in voluntary arbitration. Secretary Appleton of the British Federation of Labor expressed the opinion that the best remedy is the frank recognition more generally of employers and workmen to the right of collective bargaining. The Right Honorable Winston Churchill, Cabinet Minister and President of the Board of Trade, which corresponds to our Department of Commerce and Labor at Washington, D. C., made the statement that, in his opinion, the struggle between capital and labor is eternal, and that perpetual industrial peace can never be established. Dr. Shadwell, the labor editor of the London *Times*, said that, in his opinion, the remedy lies in strong counter organization, so that one side may better hold the other in check and by its powerful organization have a strong restraining influence on the other. Another distinguished English journalist, the editor of the London *Chronicle*, gave it as his opinion that the tendency of labor to achieve its ends seemed to be in the direction of electing representatives to Parliament rather than through strikes. Sir Charles Furness, one of England's great shipbuilders,

believes the remedy lies in copartnership, and has shown his faith in such remedy by offering to sell to his workmen shares of stock in his enterprise and accept deferred payments at the rate of five per cent of the weekly wage, with the understanding, however, that there must be no strikes or lockouts. This offer has been accepted by his employees. Richard Bell, member of Parliament and a labor leader, expressed to me the opinion that further relief must come along the line of compulsory inquiry.

THE VALUE OF BRITISH PUBLIC OPINION IN RELATION TO STRIKES AND LOCKOUTS.

The Right Honorable John Burns placed little value on the influence of public opinion in its effect on strikes and lockouts. He maintained that the great growth during the past fifteen years of employers' associations and labor unions has tended to make both more and more indifferent to public sentiment, which he, for one, regarded as a negligible factor in labor disputes. This opinion was shared by Dr. Shadwell, the labor editor of the London *Times*, and one who is regarded as an eminent authority on labor questions.

As against these opinions are those, however, of such men as Richard Bell, member of Parliament and secretary of the Amalgamated Railway Employees' Union, the Right Honorable Thomas Burt, for forty-three years secretary of the Northumberland Coal Miners' Association, Sir Albert Slicer, president of the London Chamber of Commerce, George Howell, Esq., ex-member of Parliament and an acknowledged British authority on labor questions, whose contention is that public opinion, as a rule, is the ultimate deciding factor in strikes and lockouts, C. G. Hyde, Esq., member of Parliament and a great British contractor, Robert Donald, editor of the London *Chronicle*, and others, all of whom expressed themselves as regarding public opinion in the matter of strikes and lockouts, more especially when taken in connection with a public utility, as a factor of great force.

CONCILIATION AND VOLUNTARY ARBITRATION.

Great Britain, because of its splendid record and its achievements along the line of conciliation and arbitration in labor disputes, may be rightly regarded, among the countries I have thus far investigated, as the nursery for peaceful methods of adjusting labor difficulties. The first great step along these lines was taken by the London Chamber of Commerce which, shortly after the great strike of dock laborers some seventeen or more years ago, on the initiative of Sir Samuel Boulton, began a movement for the peaceful settlement of labor disputes, which has upset all preconceived notions of conciliation and arbitration methods, and which has proven an unqualified success.

It was the opinion in Great Britain then, as it is the opinion in most places to-day, that in the adjustment of labor disputes by arbitration there must, as a rule, be three parties (*a*) representatives for each disputant; and (*b*) a third party to act as chairman and referee and to give the casting vote. The chamber of commerce adopted an entirely new principle and eliminated the third factor, namely, the referee or deciding member. By consultation with the trade unions two panels were elected of twelve members each, one panel from among the members of the chamber of commerce and the other panel of twelve members from among the trades unions. Every dispute brought before the chamber of commerce was referred to a committee of one or two, or a greater equal number, of jurors chosen from each of these two panels. No member chosen, however, had any direct interest in the dispute in hand.

For seventeen years these committees, separately chosen for each case, have acted on all disputes brought before them with the remarkable record that their decisions, without exception, have been unanimous, and with the still more remarkable record that, without exception, their decisions have been accepted and carried out in good faith in every case by both parties to the dispute. The labors of the chamber have been confined to disputes arising in Greater London.

In addition to the foregoing movement, Parliament, in 1896, passed a conciliation act empowering the board of trade, which, as previously explained, corresponds to the Department of Commerce and Labor at Washington, D. C., to appoint a conciliator in trade disputes and an arbitrator at the request of both parties.

When contestants will not listen to arbitration, the board of trade usually sends a high grade man as conciliator, who talks separately with each party in the hope of reaching a common ground. Sometimes this plan succeeds. Where it fails the department will send a representative on the ground, who makes the best possible report based on whatever information he finds available, and this report is published for the benefit of the public.

As an illustration of the way the board of trade sometimes finds it essential to operate may be cited, as a case in point, the action it took in 1907 in averting what threatened to be the greatest railway strike in the history of the United Kingdom.

A demand was made by the representative of the Amalgamated Railway Employees' Association for a number of concessions, including an increase of wages, a shortening of hours and recognition of the amalgamated association. The railway companies firmly refused to consider the demands. A referendum vote was finally taken by the amalgamated association on the question of going out on strike, which carried by an overwhelming majority. The public became greatly alarmed for

fear of the traffic of the United Kingdom becoming seriously crippled, if not paralyzed, for an indefinite period. The outlook grew so serious that the Right Honorable Lloyd George, then the president of the board of trade, personally assumed the rolê of conciliator and interviewed separately the representatives of each side. At first he found the situation apparently irreconcilable, the chief point of difference being the question of recognizing the amalgamated association, which the railway companies absolutely refused to consider, though quite ready and willing to deal with the separate railway unions. The strike seemed apparently inevitable and Mr. George found himself obliged to abandon his hope of at least bringing the two contending parties face to face. As related to me by one of the railway managers, Mr. George then invited the railway managers to meet him collectively in one of the board of trade rooms, and at the same time invited the labor representatives to meet him in another one of the board of trade rooms. After spending hours in going from one room to the other, and getting first one concession from one side and then another concession from the other side, he gradually arrived at a common ground upon which a compromise settlement was effected. The railway companies remaining immovable in their determination not to recognize the amalgamated association, it was finally arranged that a separate agreement should be made between the railway companies and the board of trade, and also between the amalgamated association and the board of trade, both parties binding themselves to the board of trade to choose conciliators from among themselves to whom were to be submitted all grievances for adjustment relating to hours, wages, etc. In the event of the conciliators failing to reach an understanding the matters were to be settled by arbitration, the board of trade to appoint the arbitrators, whose award was to be binding on both parties. These agreements were to hold good for a period of seven years. In this wise was averted what might have proven one of the most disastrous strikes in the railway history of the United Kingdom.

These slender means of intervention, says the Right Honorable Winston Churchill, president of the board of trade, have been employed in cases where opportunity has offered, and the work of the department in this sphere has considerably increased in recent years. In 1905 the board of trade intervened in fourteen disputes and settled them all; in 1906 they intervened in twenty cases and settled sixteen; in 1907 they intervened in thirty-nine cases and settled thirty-two; while during the first eight months of 1908 no fewer than forty-seven cases of intervention have occurred, of which thirty-five have already been settled, while some of the remainder are still being dealt with.

Believing that the time has now arrived when the scale of these operations deserves the creation of some more formal and permanent machinery, he has decided to set up a standing court of arbitration.

Accordingly, early in October, 1908, he nominated three panels of about fifteen members each, the first panel (of chairmen) being persons of eminence and impartiality, the second panel being drawn from the "employers' class," and the third panel from the class of workmen and trade unionists. The court will sit wherever required, composed of three or five members, according to the wishes of the parties, with fees and expenses to the members of the court and the chairman during the sittings. This court will be nominated from the foregoing three panels by the board of trade.

Many in England look with favor on this new plan and have great hopes of it achieving large and important results in further reducing the number of strikes and lockouts. In the opinion of some of the members of the London Chamber of Commerce, who have had long experience with their own peculiar plan herein described, the probable point of failure in the new board of trade scheme will be the panel comprised of persons of eminence and impartiality from whom the chairmen are to be chosen. In the opinion of the expert critics of the London Chamber of Commerce the plan would be much stronger and likely to prove more efficacious if, in accordance with their own plan of operations, there were but two panels out of which the court was to be chosen—employers and workmen.

The most important factor, however, in the progress made along the lines of conciliation and arbitration has been the attitude of the British labor unions themselves. Article 3, rule 1 of the by-laws of the General Federation of Trade Unions reads: "It is the purpose of the General Federation to promote industrial peace, and by all amicable means, such as conciliation, mediation, reference, or by the establishing of permanent boards, to prevent strikes and lockouts between employers and workmen, or disputes between trades or organizations; where differences do occur to assist in their settlement by just and equitable methods."

Nor have these been idle words used for "dress parade" purposes. The British Federation of Trade Unions has, as a rule, acted up to the very spirit of this by-law, and has left nothing undone to settle labor disputes peacefully.

As the result of these various movements eighty-nine boards of conciliation and arbitration took action in 1907. The number of cases considered were fifteen hundred and forty-five, out of which six hundred and sixty-eight were settled without stoppage of work. Only seven cases involved a stoppage of work. In seven hundred and seventy-eight cases the questions in dispute were either withdrawn or settled independently, eighty-eight cases being still under consideration at the close of the year.

At this writing there are, according to the latest government report,

two hundred and nine boards of conciliation and arbitration in the United Kingdom.

The last report of the Board of Trade for 1907 states that 58.80 per cent of workers' wages have been changed through the medium of conciliation. As an illustration of the growth in the last ten years of conciliation as a means for the peaceful adjustment of questions of wages, the following comparative statement is taken from the 1907 report of the Board of Trade:

Year.	Number.*	Percentage.
1898	32,514	3.2
1907	732,768	58.8

COMPULSORY ARBITRATION.

I found but one labor authority in my British investigations who favored compulsory arbitration: The Honorable Mr. Pember Reeves, High Commissioner for New Zealand, through whose efforts, while Labor Minister in New Zealand, the compulsory arbitration laws of that colony were passed in 1895. To him it seemed passing strange, if not incomprehensible, why British wage-earners should oppose compulsory arbitration with the record before them in New Zealand of an increase in the trade union membership under compulsory arbitration of from ten thousand to thirty-three thousand. He acknowledged that some weak spots had broken out in the New Zealand laws during the past year, but he maintained that the New Zealand legislature was earnestly at work strengthening these weak spots, and that he was confident that they would succeed in so amending the existing law that every decision of the court of compulsory arbitration could be successfully enforced against employers and workmen.

I found, however, that Mr. Reeves stands practically alone in this opinion. All the other labor authorities that I was enabled to meet while in England gave it as their unqualified opinion that no compulsory arbitration law could be framed that would compel men to go to work when they did not want to work, and that a compulsory arbitration law was of no practical value, if labor, as well as capital, could not be compelled to abide by the court decisions, and that, in any event, so far as their opinions went, compulsory arbitration in the United Kingdom was neither desirable nor practicable.

There seems, however, to be a growing interest on the part of the British employers and workmen in the matter of compulsory inquiry in dealing with cases where one side or the other, or both, are not amenable to conciliation and arbitration. It is along these lines that I hope to make further investigations when I reach those great experimental grounds for modern and progressive labor legislation, Australia and New Zealand.

*Number of wage-earners whose wages were arranged by conciliation boards, mediation and arbitration.

VICTORIA, AUSTRALIA.

The commonwealth of Australia is composed of the six following states: New South Wales, Victoria, Queensland, South Australia, West Australia, and Transmania. The estimated population of the commonwealth at the end of 1907 was 4,197,037. This, with its area of 2,974,581 square miles gives it a population of 1.41 persons to the square mile against a population of 28 persons to the square mile in the United States. The most densely populated states in the Australian commonwealth are New South Wales, with its 1,568,942 people in 1907, and Victoria, with its population for the same year of 1,248,095.

These two states are also the most important in the commonwealth, commercially and industrially. By confining the time at my command to investigating the labor laws and labor conditions in these two chief centers, I feel I have been able to get a more comprehensive knowledge of such Australian labor laws and labor conditions as are likely to prove helpful to California than if I had attempted to spread my time over a wider and thinner area in the commonwealth.

I shall deal first with the State of Victoria, because it was the first government to legislate on labor questions, and in some directions it has been the pioneer, leading the way in industrial legislation for other Australasian governments.

THE CONDITIONS OF LIFE OF THE AUSTRALIAN WORKER.

The conditions under which the Australian wage-earner lives are most favorable. He enjoys a most salubrious climate, where neither extreme heat nor extreme cold need be provided for. He can work out in the open, rains excepted, most every day in the year. The health of his people is most excellent, the death rate of Australia, 10.8 per thousand, next to New Zealand, being the lowest in the world, and living in one of the greatest food producing countries, he commands good and abundant food at a most moderate cost, while his wage rates, next to America and New Zealand, are the highest in the world. These favorable conditions, combined with his thrift, sobriety, high intelligence and law-abiding qualities, place him among the world's wage-earning aristocracy.

POLITICAL ACTIVITY OF LABOR.

In more recent years through the growth of unionism, the wage-earners have as a labor party taken a most active interest in the

political affairs of the country. At this writing there are now but two political parties in the commonwealth of Australia, the Labor party and the Coalition party, which latter consists of the free traders and the protectionists, who within this past week have united in order to oust the Labor administration from power, after it has been occupying the administrative saddle for many months, where it surprised its enemies and gratified its friends by the wisdom and conservativeness of its administration.

CHARACTER OF AUSTRALIAN LABOR LEADERS.

The Australian labor leaders have shown unusual ability and high integrity and when placed in political power, have commanded the respect of even their political opponents, by their honesty, their earnestness and the fidelity displayed to their public trust.

TRADE UNIONISM AND LABOR LEGISLATION.

The history and scope of Victorian trades unions and labor legislation is briefly told in the Commonwealth Yearbook for 1909, from which I take the following:

DEVELOPMENT OF TRADES UNIONS IN AUSTRALIA IN GENERAL.

(Official Yearbook of Australia, p. 104.)

In Australia, industrial unionism paved the way to industrial legislation. Conditions of employment were on the whole favorable to the investigation of industrial problems and the experimental legislation was possible because of the simplicity and and directness of aim of those engaged in industrial occupations. Moreover, the nonexistence of the complexity of the problems and of the organizations of the older countries did not impose the difficulties that might otherwise have operated. Hence also rapid changes in the laws governing industry occur and are likely to occur. To a great extent the trades unions were responsible for these laws. They steadily and continuously urged an amelioration of the condition of the workingman, and by organization and discipline they presented a united front to opposing forces and obtained many advantages by a recognition of the principle that union is strength. Their efforts have resulted in improved conditions, particularly short hours and a healthier mode of life. One great aim of present day industrial legislation has been said to be to extend "The reasonable comforts of a civilized community" to those engaged in every branch of industry. Large organizations have been able to obtain their ends by force of numbers, and, in the case of the great bulk of the artisan and similar classes, through the solidity of their unions. The smaller and less perfectly organized industries, unable to maintain an effectual struggle with hope of success, are now receiving, by legislative enactment, the benefits already secured to trades unions.

While the demands of the early unions have almost in their entirety been conceded by the employers, unionism nevertheless continues. Industrial legislation has not yet reached the stage when the conflicts between employer and employee cease. A numerically strong union will sometimes obtain its end by the threat and sometimes by the fulfillment of the threat of a strike.

(Yearbook, p. 1049.)

The first Melbourne eight-hour procession was held in 1856, the trades taking part being the masons, bricklayers, carpenters, joiners, plasterers, painters and slaters. In the following year about 700 men took part in the function, but the principle of the eight-hour day had been recognized, and new unions were quickly established under the influence and guidance of the pioneers of the movement.

(Yearbook, p. 1064-6.)

Two systems, based on different principles, exist in Australia for the regulation of wages and general terms of contracts of employment. A "wages boards" system exists in New South Wales, Victoria, Queensland, and South Australia, and an arbitration court in Western Australia. In New South Wales the Industrial Arbitration Acts of 1901 and 1905 instituted an arbitration court. This court expired on June 30, 1908, having delivered its last judgment on the previous day. Wages boards were substituted under the Industrial Disputes Act, 1908. There is also the arbitration court of the commonwealth, which has power, however, to deal only with matters extending beyond the limits of a single state.

Wages Boards.—This system was introduced into Victoria by the Factories and Shops Act of 1896. The original bill made provision only for the regulation of the wages of women and children, but was afterwards amended in Parliament to extend the system to adult operatives of both sexes.

The act of 1896 made provision for the regulation of wages only in the clothing and furniture trades, and in the bread-making and butchering trades. By the act of 1900 the operations of the act were extended to include all persons employed either inside or outside a "factory" or "workshop"—section 4, i. (*a*)—in any trade usually carried on therein. This section is now in the act of 1905. An act of 1907 extended the system to trades and businesses not connected in any way with factories, making provision for the appointment of wages boards for shop employees, carters and drivers, persons employed in connection with building and quarrying, or the preparation of firewood for sale, or the distribution of wood, coke or coal. It is proposed to extend the system to mines, provisions to do so being made in the mines bill introduced into Parliament.

The regulation is made by a board, called a special board, to distinguish it from the board of health. Boards for the regulation of wages in the trades specified in the act of 1896 are appointed as a matter of course, and by the executive other boards are appointed only if a resolution for appointment be passed by both houses of Parliament. A board consists of from four to ten members who must be or must have been at a recent time prior to the appointment engaged in the trade concerned. Employers and employees are equally represented. If one fifth of the employers or the employees object to a representative nominated for them they can elect one. Originally the board was elected in the first instance, but the difficulty in compiling the electoral roll led to the adoption of the present system, which has proved satisfactory. The furniture board is nominated outright owing to the preponderance of Chinese. An independent chairman, nominated by the board, is appointed by the executive. A board holds office for three years.

The board has power to determine the lowest wages or prices or rates to be paid to any persons or classes of persons coming within the act, for wholly or partly preparing, manufacturing, or repairing articles, or for other services rendered, and may fix special rates for old, slow or infirm workers.

The board fixes the hours of work, and may limit the number of "improvers" to be employed (usually done by prescribing the number to each journeyman employed). There is no power in Victoria to limit the number of apprentices employed. Such power exists in South Australia. The board fixes the wages of apprentices and improvers according to age, sex, and experience, and may fix a graduated scale of wages calculated on the same basis. Apprentices bound for less than three years are improvers, unless the minister sanctions a shorter period of apprenticeship on account of previous experience in the trade. The minister may sanction the employment of an improver over twenty-one years of age at a rate proportionate to his experience. Outworkers, in the clothing trade, must be paid piece rates. Manufacturers may, by leave of the board, fix their own piece rates, if calculated on the average wages of time workers as fixed by the board.

Licenses for twelve months to work at a fixed rate lower than the minimum rate may be granted by the chief inspector of factories to persons unable to obtain employment by reason of age, slowness or infirmity. Licenses are renewable.

Determinations remain in force till altered by the board or by the court of appeal.

These determinations apply to all cities and towns and to such boroughs as the executive may determine, and the executive may also apply them to any shire within ten miles of a city or town, if the shire council petition to that effect. (Similar provisions are in force in other states.)

The children of an employer are exempt from a determination.

The executive may direct a board to fix outworkers' rates and the rates payable in allied trades. Boards are given power to fix the wages to be paid to persons employed on repairs.

Penalties are fixed for the direct or indirect contravention of determinations, the obedience to which is ascertained by the examination of the records of wages, etc. (Section 4, i, *a*.)

A court of appeal, consisting of a supreme court judge, has power to review the determination of the boards. The court may appoint assessors to assist the judge.

The act fixes an absolute weekly minimum wage, and evasion of this provision in the case of females employed in the clothing trade by charging an apprenticeship premium, is prevented by the prohibition of all such premiums in that particular case.

WAGES BOARDS.

(Yearbook, p. 1079.)

Wages boards are appointed upon application of either employers or employees. The grounds usually urged by the former is that their business is hampered by unfair competitors, who pay only a sweating wage; by the latter that they are sweated or are entitled to a consideration of their wages, by reason of the prosperity of the trade in which they are employed.

According to the latest Yearbook there are 146,000 industrial workers in Victoria out of which the following number are employed in registered factories:

Total number of distinct trades carried on in registered factories	152
Total trades under boards	51
Total factories registered	5,003
Total employees	71,968
Total employees under wages boards	56,994
Percentage under boards	80
Number of determinations	48

The following table shows the number of convictions for disobedience to determinations of boards (not including overtime working):

1901	34	1905	27
1902	33	1906	52
1903	41	1907	43
1904	39		

WAGES.

The tendency of wages here as elsewhere in the industrial world, has during the past decade been upward. As shown by a table published in the Melbourne *Age* of March, 1909, by G. M. Pendergast, labor leader and member of Parliament of Victoria, the wages in sixty-two industries have increased on an average 15.665 per cent since the awards of the wages boards dealing with these industries have gone into effect. Among the wages quoted in the foregoing article is to be noted the following per week:

Shoemakers	$12.00	Brickmakers	$11.33
Cigarmakers	8.81	Ironmolders	10.27
Printers	10.33	Saddlery	8.16
Stonecutters	12.04	Tinsmith	7.75
Woodworkers	10.72		

The wages of highly skilled labor, according to Secretary Barker of the Melbourne Labor Council, is from 10 to 12 shillings ($2.40 to ($2.88) a day, and for unskilled labor from 7 to 9 shillings ($1.68 to $2.16) a day.

HOURS OF LABOR.

An eight-hour day was established in Victoria in the building trades in 1856. The average hours in the building trades in the United States so late as 1890 were fifty-four per week, and at the end of 1903, forty-eight hours a week, a stage which Victoria reached fifty-three years ago.

The Commonwealth Yearbook for 1909, page 1049, tells the story of the eight-hour day as follows:

COMMENCEMENT OF THE EIGHT-HOUR SYSTEM.

The first trade union in Australia was the "Operative Masons Society," established in Melbourne in 1850. In 1851 a branch of the "English Amalgamated Society of Engineers" was founded in Sydney. For many years practically the only unions existing were those formed by the several branches of the building trades. They were all subject to the English law prohibiting conspiracies and combinations in restraint of trade, though it does not appear that any such law was ever put in force in Australia. The main object of the early unions in Australia was the limitation of the working week to forty-eight hours. The minor and friendly society benefits that were usual among the unions of older countries were also desired; but the chief aim was the establishment of the eight-hour principle, and that aim for many years was the chief link between the unions. It is difficult to obtain detailed information concerning the unions prior to trade union legislation, but their early history generally resolves itself into an account of the early efforts put forth by metropolitan operatives to secure the limitation of the working day to eight hours.

COST OF LIVING.

During the past decade the cost of living, including rent, has advanced. There are no reliable statistics to tell just what percentage of increase has taken place.

From the consensus of opinions expressed by men in various walks of life, I should say that while in some things, especially in the matter of rent, the cost has increased beyond the increase in the wage rate, yet on the whole, the gain in wages has covered the increased cost of living and left a small margin besides.

THE ATTITUDE TOWARD UNION LABOR.

The attitude of the Victorian public toward labor organizations is friendly. Some employers are hostile to labor legislation rather than to labor unions. Other employers maintain that labor in Victoria is despotic and unreasonable; yet other employers admit that the conservative rich want to keep labor permanently in its place and within its class, on the other hand, that labor Socialists are preaching class consciousness. Still other employers contend that much friction and ill will is caused by virtue of the fact that there is no finality to the demands

of labor. Professor Moore, of the University of Melbourne, gave it as his opinion that the relations between employers and their men were strained and likely to become more so. Chief Factory Inspector Ord, who because of his official position has an unusual opportunity of getting in touch with employers and their men, expressed the view that so far as the manufacturing industries of the state are concerned, the relations between employers and their men are not of an unfriendly character.

EMPLOYERS' ASSOCIATIONS.

Employers are organized for the purpose of meeting and offsetting claims of unionists before wages boards. Their organizations, however, are said to be not nearly so comprehensive or effective as those of the men.

"CLOSED SHOP."

There are comparatively few "closed" shops in Victoria. Union and nonunion wage-earners, as a rule, work side by side.

STRIKES AND LOCKOUTS.

There were no strikes in Victoria in 1908, except of a trifling character or brief duration, not over 1,000 workers being involved. No official record is kept in Victoria of strikes and lockouts, due to the fact that there have been so few in the state during the past twelve years, not over eight or nine in all.

Chief Factory Inspector Ord, in his report for 1907, says:

> It has never been claimed by those in favor of wages boards that the system will stop strikes, but for ten years no strike of any importance took place, and it was thought that by merely bringing employers and employees together to discuss wages, the chances of a strike would be greatly reduced.
>
> Until the last Parliament there was no reference to strikes in the Factories and Shops Act, but the legislature has now given the governor in council the power to suspend a determination of a board or of a court, for any period not exceeding twelve months, when a strike or organized industrial dispute is about to take place, in connection with any trade or business, subject to the decision of a board or the industrial court of appeals.
>
> So far as employees are concerned, the only effect of such a provision is that the men affected run the risk of losing the benefits of the determination of a board for twelve months.
>
> As regards the employers, however, the results are more far reaching. They are at liberty to engage men at such rates as may be agreed upon, instead of being compelled to pay the rates fixed by the board for, possibly, inferior and emergency labor.

STRIKING AGAINST LEGAL AWARDS.

The only Victorian instance on record in twelve years of men striking against a legal award was in the case of the Melbourne bakers, who, in the end, won their strike.

The story of this strike is herewith told by Chief Factory Inspector Ord in his report for 1907.

BREAD BOARD.

(Chief Factory Inspector's Report for 1907, pp. 18-19, Appendix "B," Victoria Report.)

For the first time in ten years a strike of some importance took place in a trade under a special board. It is a remarkable thing, however, that the strike was not against the determination of the bread board, but in consequence of the court of industrial appeal altering a determination of the board. The bread board on the casting vote of the chairman raised the wages of journeymen from £2 10s. per week of forty-eight hours to £2 14s. per week. This determination was dated 12th of June, 1907, and came into force on the 5th of August, 1907.

On the 15th of August the employers' representatives on the board appealed, under provisions of section 123 of the "Factories and Shops Act, 1905," to the court against the increase of wages allowed by the board.

The court (Mr. Justice Hood) after hearing the evidence, reduced the wages from £2 14s. to £2 10s. from the 15th of September, 1907.

It will be seen that from the 5th of August to the 15th of September the men had been receiving the increased wage allowed by the board. This fact, no doubt, had a great deal to do with the action of the union later on, as men do not willingly submit to a reduction of wages, no matter how obtained, and in this case it had been granted by a tribunal appointed by Parliament for the fixing of wages.

In any case as soon as the employers reduced the wages of the union men to £2 10s. per week, the union intimated that unless the men were paid at the wages fixed by the board the members of the union would be called out.

The employers, having secured a favorable decision from the court of industrial appeals, refused to give way, and the union at once called out all the men over whom it had control.

The strike commenced on the 29th of September. It was not of long duration. On the 2d of October the majority of the employers concerned granted the demands of the union, and the strike was over.

All those who are sincerely desirous of the success of the wages board system can not but regret the occurrence of this strike. At the same time it must not be forgotten that the strike was not against the decision of the wages board, but against that of the court of appeal.

STATE CONCILIATION AND ARBITRATION.

The only provision for State intervention in labor disputes is through the medium of wages boards and an industrial court of appeals, as described above.

Wage-earners are anxious to have the industrial court of appeals abolished and to make the decision of the wages boards final, but there is no likelihood of the abolition of this court, as employers would strongly oppose such action.

COMPULSORY ARBITRATION.

Victoria has never had compulsory arbitration. Many wage-earners favor its adoption on the grounds, as they claim, that it stands for giving labor unionists a preference in employment, and that it also limits the number of apprentices. Victorian employers, on the other hand, are much opposed to the adoption of compulsory arbitration, and if any attempt were made to introduce it, would bitterly fight the proposal. Victorian employers agree that while the best conceivable con-

dition in dealing with labor is to let the law of supply and demand prevail, they are practically unanimous in the opinion that wages boards from their point of view are a lesser evil than compulsory arbitration.

Secretary Walpole of the Employers' Association of Melbourne says: Of all experimental legislation concerning wages, hours, and conditions, that has been and is in force in this country, wages boards are the fairest and have the best record of administration.

THE EFFICIENCY OF LABOR.

Labor representatives claim that unionism in Victoria has increased the efficiency of labor. Some employers claim it has slightly decreased it. Yet other employers hold that it has not affected labor efficiency one way or the other. Ernest Aves in his report to the British Parliament under date of March, 1908, quotes a Victorian clothing manufacturer as saying that wages in his trade had increased twenty per cent and that cost of manufacturing had decreased thirty-five per cent, largely due to increased efficiency.

THE INFLUENCE OF VICTORIAN LABOR LEGISLATION ON THE UNSETTLEMENT OF BUSINESS.

While some Victorian employers contend that the labor laws have tended to unsettle business, I was unable to obtain any tangible evidence of this. On the contrary, so far as I could find, Victorian employers have enjoyed a far higher degree of industrial peace in the past twelve years than has been enjoyed by employers in Europe or in the United States.

This, in my opinion, is very largely due to its existing labor legislation, which has furnished legal machinery for the prompt adjustment of the vexed questions of wages and hours, thus preventing almost entirely a resort to strikes and lockouts.

The Victorian employers who contend that its labor legislation and the wages boards have tended to unsettle business, and who would prefer to let the laws of labor supply and demand prevail untrammeled, do not seem to realize that the most disturbing industrial elements are strikes and lockouts, and that where the State fails to furnish legal machinery for the settlement of labor disputes, but leaves such settlement to the law of labor supply and demand, strikes and lockouts prevail at a frightful cost to labor, to capital, and to the body politic generally.

While there is nothing in the law to prevent the Victorian labor unions from stepping in and disturbing the otherwise harmonious relations existing between an employer and his men, there were no cases brought to my notice where this had taken place. The fact that

the Minister of Labor, under the law, has the power to suspend for twelve months wages board determinations, if an organized strike is threatened or takes place, seems to have a great restraining influence on hasty or thoughtless action on the part of overzealous wage-workers or their leaders.

Under the wages board system there is little or no occasion for the unsettlement or disturbance of industrial affairs, because with its permanent separate wages board, composed of representatives of employers and workers in the trade, presided over by an impartial chairman, quick action is possible, so that a congestion of cases with the consequent delay in a decision of months and sometimes years, such as have taken place in New South Wales and in New Zealand, under the former laws relating to compulsory arbitration, becomes impossible.

Victorian labor laws do not make for *absolute* certainty in business because the wages board has the right from time to time to increase or decrease the minimum wage. On the other hand, it does make for a far higher degree of certainty than where there is no legal wage established and where strong unions can, without State intervention, demand an immediate increase in wages. Under the wages board system, the matter of an increased wage must be inquired into by a board upon which employers and men are represented, an agreement reached, and a decision rendered by the chairman, subject to the approval on appeal to the industrial court of appeal, thus affording the employer a reasonable protection against unreasonable demands, and thus also protecting the wage-worker against a hasty or ill judging strike which may subject him to irreparable loss and injury.

DOES THE LAW ENCROACH ON THE LIBERTY OF PERSON AND PROPERTY OR USURP THE MANAGEMENT OF AN EMPLOYER'S BUSINESS?

In common with most laws, wages boards encroach upon the liberty of persons and property, but in return for this seeming loss they afford the worker and his employer, as well as the community, a very high degree of industrial peace.

The greatest sufferers under the law are the unfair employers who endeavor for profit to evade its provisions or the determinations of the wages boards, and who, when convicted, are penalized by the court.

The law so far interferes with private business management as to determine the *least* but not the *most* it can pay for its labor, the number of apprentices it can employ, and so on. In effect, it interferes with private management to the degree that a strong American labor union interferes with private management, with the difference, however, that strong labor unions will frequently fix conditions regardless of the views of employers; whereas, under the wages board system, the em-

ployer in common with the worker has a voice in determining these matters.

CAN EMPLOYEES OBTAIN EMPLOYMENT EXCEPT UPON TERMS FIXED BY THE COURT?

The system is hardest upon the slow or inefficient worker who can not make himself worth the minimum wage fixed by the wages board. This sort of worker must obtain a special legal permit from the Chief Factory Inspector, allowing him to work for less than the legal minimum wage, which permit can be issued under the following act:

OLD, SLOW AND INFIRM WORKERS.

(Factories and Shops Act, 1975, clause 7, par. 99½, part IX.)

If it is proved to the satisfaction of the chief inspector that any person by reason of age, slowness, or infirmity is unable to find employment at the minimum wage fixed by the special board, the chief inspector may in such case grant to such aged, slow or infirm worker a license for twelve months to work at a less wage (to be named in such license) than the said minimum wage, and such license may be renewed from time to time.

The number of such persons licensed as slow workers in any factory shall not without consent of the minister exceed the proportion of one fifth of the whole number of persons employed in such factory at the minimum wage fixed for adults or at piecework rates provided that one slow worker may be employed in any registered factory, and any person who without such consent employs any greater number than such proportion shall be guilty of a contravention of this part.

In good times the slow worker is the last to be put on, and in bad times he is the first to be sent off. This, as a rule, will be his experience in most every country and under most all industrial conditions, but since he can not make his own bargains here, it works out still harder for him under a wages board law.

ARE AWARDS EQUALLY BINDING?

No. Employers can not pay less than the amount prescribed by the award. An employee, however, need not work for the minimum wage if another employer is willing to pay him more. He may leave his employment as an individual, but men can not leave their jobs in concert (which would be equivalent to striking) without involving the risk of losing their awards.

The employer can not escape by private agreement paying the wage award, as is shown by the following legal provision:

(Factories and Shops Act, 1975, part IX, par. 114.)

Where an employer employs any person to do any work for him for which a special board has determined the lowest prices or rates, then such employer shall be liable to pay and shall pay in full in money without any deduction whatever to such person the price or rate so determined, and such person may within twelve months after such money became due take proceedings in any court of competent jurisdiction to recover from the employer the full amount or any balance due in accordance with the determination, any smaller payment or any express or implied agreement or contract to the contrary notwithstanding.

HAVE THE BOARDS INCREASED THE COST OF LIVING?

This is a mooted question due to a confusion of thought on the part of many as to the laws of economic cause and effect. Living has been increased partly by the enhanced value of land, due to increased population, and speculative discounting of future land values, thereby increasing rent, and partly because of the increased world price of all staples, which so largely enter into the wage-earner's bill of consumption. These things in turn, combined with the scarcity of labor during the highly prosperous period of the recent past, have led to higher wages, which in turn, have had some influence in the further increase in living cost. In industrial products the increased wage cost has largely been offset, however, by improved labor saving devices, so that despite a higher *wage* rate, there has, as a rule, followed a very trifling, if any, increased industrial labor *cost* rate.

WAGES BOARDS; HAVE THEY BENEFITED LABOR?

If we are to let the labor unionists speak for themselves, we shall find according to the statement made by the executive committee of the labor council, as quoted herein under the chapter of "Wages Board," that the wages boards have created favorable conditions for the workers generally that would not otherwise have existed.

CAN MEN EVADE THE LAW AND STRIKE?

Yes. If, however, a strike occurs in a trade working under an award, the government in council, through the Labor Minister, may suspend the whole or part of the determination affecting such trade for a period not exceeding twelve months. The effect of this provision is that if the men do not accept the decision of the wages board, the employers are then legally at liberty to hire whomsoever they please at any wages that may be agreed upon, to fill the places of the strikers.

DOES THE LAW DRIVE CAPITAL OUT OF THE COUNTRY?

The law may have a tendency to frighten away very timid investors, but such investors would be still more timid and more speedily driven out, in countries where there is no State intervention in labor disputes, and where powerful labor unions are in a position to dictate their own terms, and to enforce these terms by sudden and disastrous strikes.

The following figures taken from the official Yearbook of the Commonwealth of Australia for 1909, page 540, would indicate that there has been a material industrial growth in Victoria from 1903 to 1907:

AVERAGE NUMBER OF PERSONS EMPLOYED IN VICTORIA MANUFACTURING INDUSTRIES.

1903	73,229	1907	90,903

Increase, 24.10 per cent.

VALUE OF PLANT AND MACHINERY IN FACTORIES.

1903	£5,010,896	($24,302,846)
1907	£6,771,458	($32,841,572)

Increase, 35.09 per cent.

The total value of the output of factories in Victoria for 1907, according to the same authority, page 552, was £29,693,634 ($144,014,125).

DOES THE LAW ENCOURAGE IMPORTS RATHER THAN LOCAL MANUFACTORIES?

Imports have largely increased due (*a*) to the high degree of prosperity enjoyed in recent years leading to a consequent increased demand for luxuries and grades of finer and more fashionable goods, especially in wearing apparel, than the State produces; and (*b*) to the scarcity of skilled labor, more especially female labor, thus preventing many manufacturers from increasing their capacity to keep pace with the increasing demand. This point is emphasized by the Chief Factory Inspector, who in his report for 1907 says:

STATE OF TRADE.

(Chief Factory Inspector's Report for 1907.)

The only complaints made by manufacturers were on account of the scarcity of labor. This was more particularly the case in trades in which female labor predominates, and every effort was made to increase the supply, but without success. The manufacturers found it simply impossible to get sufficient labor. Many of them informed me that they had advertised day after day in the newspapers for girls to learn the trade without receiving a single reply. One clothing manufacturer offered to pay double the legal wage to apprentices without success, though he was prepared to pay a skilled worker to devote all her time to teaching the apprentices.

The industrial growth is illustrated by the Chief Factory Inspector's report of 1907, which reads as follows:

STATE OF TRADE.

(Chief Factory Inspector's Report for December, 1907.)

3,739 factories employing 45,178 persons were registered in 1897.
5,003 factories employing 71,968 persons were registered in 1907.

EFFECT OF WAGES BOARDS SYSTEM ON RURAL DISTRICTS.

The higher city wages militates, as a rule, against rural manufacturers retaining their best labor. In good times it also militates against the farmer holding his farm laborers in the face of city competition, in the way of higher wages, but the condition is in nowise any more serious in the rural districts of Victoria, than in other countries where no wages boards exist.

WAGES BOARDS—HOW THEY ARE BROUGHT INTO EXISTENCE.

Chief Factory Inspector Ord in his report for 1907 tells in the following manner how wages boards in Victoria are brought into existence:

MODE OF CONSTITUTING SPECIAL BOARDS AND OF APPOINTING MEMBERS.

(Chief Inspector of Factories' Report for 1907, pp. 10-12, Appendix A.)

I have been so constantly asked how boards are brought into existence, the members appointed, and determinations reviewed, that I think it desirable to shortly

describe the whole procedure. It is necessary to remember that the constitution of a board and the appointment of members of a board involve two distinct procedures.

Before a special board is constituted, it is necessary that a resolution in favor of such a course should be carried in both houses of the legislature. (Section 2, Act 1975.)

It is usual for the minister administrating the factories act should move that such a resolution be passed.

The minister may be induced to adopt such a course, either by representations made by employers and employees, or by employees alone, or by the report of the officers of the department.

The reasons alleged by the employers for desiring a board are, usually, unfair competition; and those by the employees, low wages, and often the employment of excessive juvenile labor. If the minister is satisfied that a case has been made out, he will move the necessary resolution in Parliament, and when such resolution has been carried, an order in council is passed constituting the board.

The order indicates the number of members to sit on the board. The number of members must not be less than four or more than ten. (Section 75, Act 1975.)

The minister then invites in the daily press, nominates for the requisite number of representatives of employers and employees. These representatives must be or must have been employers or employees, as the case may be, actually engaged in the trade to be affected. All that is necessary is, that the full names and addresses of persons willing to act should be sent in.

Where there are associations of employers or of employees, it is not often that more than the number of nominations are sent in. In any case, the minister selects from the persons whose names are received the necessary number to make up the full board.

The names of persons so nominated by the minister are published in the *Government Gazette*, and unless within twenty-one days one fifth of the employers or one fifth of the employees, as the case may be, forward a notice in writing that they object to such nominations, the persons so nominated are appointed members of the board by the governor in council. (Section 3, Act 1975.)

If one fifth of the employers or the employees object to the persons nominated by the minister, and they must object to all the nominations, and not to individuals, an election is held under regulation made in accordance with the act. (Section 77 (3), 1975.)

Shortly stated employers may have from one to four votes according to the size of the factories as regards the election of employers, but as regards a special board for shops, each employer has only one vote, and each employee in the trade over eighteen years of age has a vote in the election of representatives of employees.

The chief inspector conducts such elections, the ballot being by post, the ballot papers being forwarded to each elector.

Within a few days of their appointment the members are invited to meet in a room at the office of the chief inspector of factories, and a person, always a government officer, and usually an officer of the chief inspector's department, is appointed to act as secretary.

The members must elect a chairman within fourteen days of the date of their appointment, and if they can not agree to a chairman he is appointed by the governor in council. (Section 82 (1), 1975.)

The times of the meeting, the mode of carrying on the business, and all procedure is in the future entirely in the hands of the board, whose powers are defined in sections 84-90, Act 1975, and sections 15 and 16 of Act 2137.

Vacancies in special boards are filled on the nomination of the minister without any possibility of either employer or employee objecting (section 181, 1975). And the same course is observed regarding all appointments of members of the furniture board. (Section 78, Act 1975.)

The result of the labors of a board is called a "determination," and each item of such determination must be carried by a majority of the board.

It will be seen that, unless employers and employees agree, a full attendance of

the board is required, as, in case of a difference of opinion, the chairman decides the matter, and he has only one vote, the same as any other member of the board.

When a determination has been finally made, it must be signed by the chairman, and forwarded to the Minister of Labor. The board fixes a date on which the determination should come into force, but this date can not be within thirty days of its signature by the chairman.

If the minister is satisfied that the determination is in form and can be enforced, it is duly gazetted. (Section 101 (1), 1975.)

In the event of the minister considering that any determination may cause injury to the trade, or injustice in any way whatever, he may suspend same for any period, not exceeding six months, and the board is then required to reconsider the determination.

If the board does not make any alteration, and is satisfied that the fears are groundless, the suspension may be removed by notice in the *Government Gazette*. (Section 105, 1975.)

This power is not, however, likely to be used by the minister, as proceeding is now made under part X of Act No. 1907, by which either employers or employees may appeal to the court of industrial appeals against any determination of a board.

This court consists of any one of the judges of the supreme court sitting alone, and the judges arrange which of them shall for the time being constitute the court.

An appeal may be lodged (*a*) by a majority of the employers' representatives on a special board; (*b*) the majority of the employees' representatives on the special board; (*c*) any employer or group of employers who employ not less than twenty-five per cent of the total number of workers in the trade to be affected; or, (*d*) twenty-five per cent of the workers in any trade.

The court has all the power of a special board, and may alter or amend the determination in any way it sees fit.

The decision of the court is final, and can not be altered by the board, except with permission of the court, but the court may, at any time, review its own decision.

The minister has power to refer any determination of a board to the court, for its consideration, if he thinks fit, without appeal by either employer or employee.

The decision of the court is gazetted in the same way as the determination of the board, and comes into force at any date the court may fix.

The determinations of the board and of the court are enforced by the factories and shop department, and severe penalties are provided for breaches of determination. (Section 119, Act 1975.)

No proceedings for breaches of the determination can be taken by any one without the sanction of the department.

Any employee, however, may sue an employer for wages due him under any determination, notwithstanding any contract or agreement expressed or implied to the contrary. (Section 114 of Act 1975.)

HOW WAGES BOARDS ARE REGARDED.

It can not but be of interest to know how the wages boards and their operations are regarded by Victorian employers, wage-earners and government officials. Accordingly, I give herewith an extract taken from a paper by W. N. Pratt, Esq., read before the Conference of Australian Employers' Federation and published in its report for 1905, pages 85 to 93, which I feel fairly represents the consensus of opinion among the Victorian employers:

The one original reason for the formation of the wages boards was to prevent sweating. Mr. Harrison Ord, Chief Factories Inspector, says: "The board was created to prevent sweating" (1898, page 6). I can find no other real reason, and the method by which this has to be done is set out in the act itself. Clause 14, Act 1857, passed in 1903, says: "The board shall ascertain the average prices or

rates paid by reputable employers to employees of average capacity. The lowest prices or rates as fixed by any determination shall in no case exceed the average prices or rates so ascertained."

While denying that sweating existed to any great extent in the majority of trades, we are obliged to admit that in a few, such as clothing, white work and where females were very largely employed, sweating did exist, and to a considerable extent. A few disreputable employers had forced the hands of their more humane comrades, and by a constant cutting of prices, had sent wages down to a very low level. Individual cases of sweating among old, slow and infirm workers could also be pointed out. But it is quite certain that sweating did not exist among the strong, young and active workers; they are well able to look after themselves, and did so, commanding the highest wages and most constant employment at all times, as will always be the case. The act, then, was only needed for the protection of the old, slow and infirm workers, and for women and children, to save them from the evils of sweating.

Have the boards then accomplished the purpose for which they were established?

1. Have they put down sweating in the clothing trade? Yes, and largely in trades where women are employed. But in many other trades they have increased it, for the slow, old men have been driven to work at home for very low rates; while the female outworkers have been nearly swept away and the male outworkers in some trades have been largely increased.

2. Have they protected those who needed protection? In the case of females they have to a large extent. In the case of old, infirm and slow, they have failed to protect, though the permit system now in force will possibly effect this to a certain extent.

3. Have they increased employment? No! Whatever increase of employment has taken place has been through the natural expansion of trade, an expansion similar to that which took place between 1885 and 1889, when an increase of some 8,000 hands took place.

4. Have they raised wages? I think we must say yes, as far as the average per man is concerned, but not the extent that the bald figures show; the general improvement in trade is answerable for a deal of the rise, and the different circumstances of the two classes of trades—those under, and those not under the boards—must be considered.

I may be permitted to point out where I consider them (wages boards) preferable to an arbitration court:

1. They are more mobile, having simpler constitution and methods. The board is easily convened, its sittings and decisions are free from red tape, and it attends only to the business of its own trade, directly its business is over its sittings stop, and all expenses cease.

2. The members of the board are all experts in their own trade. All intricate questions and technicalities are easily understood, mistakes and delays are avoided, free avenues of trade easily and quickly provided for.

3. The powers of the boards are limited and defined. They deal only with the rates of wages, hours to be worked, overtime and improvers. All questions of custom or privilege are outside its powers. These fruitful causes of dispute and delay in the arbitration court are happily excluded from the boards.

4. Their decisions are more satisfactory. In a large number of instances they are unanimous, and are accepted by the whole trade without demur.

The following extract, taken from a circular issued by the executive committee of the Melbourne Trades Council, gives the consensus of opinion of the Victorian wage-earners on the value of the wages boards:

They (the executive committee) are of the opinion that arbitration courts and wages boards have not failed to give protection and relief to the sweated and other workers, but, on the contrary, they have afforded very material and financial help, and created conditions that would not have existed otherwise.

And finally, I quote herewith from the Australian Yearbook, page 1072, to give the official opinion of the value of the Victorian wages boards:

EFFECT OF ACTS.

The question whether the operation of the acts has bettered the monetary position of the operative may be answered in the affirmative. Starting from the lowest point, the provision of an absolute minimum wage per week has stopped one form of gross sweating. Another case is that of the "white workers" and dressmakers; with these the lowest form were the outworkers, who were "pieceworkers." In some branches of the Victorian trade in 1897, wages paid to outworkers for all classes of certain goods were only from one third to one half the wages paid in the factories for the low class of productions of the same line of stuff. By working very long hours the outworker could earn ten shillings (about $2.40) a week. The average wage of females in the clothing trade in 1897 was ten shillings tenpence (about $2.60) per week. There were, however, in that year 4,164 females receiving less than a pound (about $4.85) a week, and their average was eight shillings and eightpence (about $2.08). It was almost a revolution when a minimum wage of sixteen shillings (about $3.84) per week of forty-eight hours was fixed by the board; when piecework rates were fixed to insure a similar minimum, and when the outworkers were placed on the level of pieceworkers. Many employers refused to give outwork and took the workers into the factory on time work. The sanitary conditions required were far more healthy than those that could exist in poorer classes of dwellings.

CONCLUSION.

Have the Victorian wages boards been a success and have they accomplished the end in view at the time of their enactment—that of abolishing sweating and establishing industrial peace?

No impartial investigator who is seeking facts, pure and simple, can render any verdict other than that the Victorian wages boards have to use a colloquialism, more than "made good."

They were enacted primarily to prevent sweating in the industries where women and children are largely employed.

The consensus of opinion of all interested parties is that wages boards have so largely minimized sweating that it is no longer an evil in Victoria, where the "sweater" has become a somewhat rare species.

The wages boards have not alone reduced the evil of sweating to a minimum, but they have achieved other most desirable and important results not exactly anticipated at the time of the enactment of the law. The authors of the measure seemingly builded better than they knew.

The wiping out of the "sweater" has been a great blessing to the fair employer, who is no longer compelled to compete with an unfair rival who, by "squeezing" helpless labor, is in a position to undersell or underbid him.

Every Victorian manufacturer starts out on an even basis, so far as payment to labor is concerned. To secure the largest share of possible business, he must exercise his managerial ability along other lines than that of "squeezing" labor. The legal minimum wage tends to drive the "sweater" out of the field. Where no legal minimum wage

exists, the "sweater" tends to drive the fair manufacturer out of the field.

The wages boards have brought about another unexpected blessing to Victorian employers, wage-workers, and to the body politic. They have, for a period of over twelve years, aided in, if not maintained, an unprecedented era of industrial peace. The fact that the State had provided machinery where wage-earners, having wage grievances, could get a fair hearing and a fair deal at the hands of the trade experts representing both sides of the issue, and the fact that the determinations are enforceable against employers, left little occasion to resort to strikes in order to secure what they deemed equity.

In consequence Victoria, considering the numbers industrially engaged, has enjoyed the highest degree of industrial peace that in the past decade or more has been vouchsafed to any other country in any occidental government. It must, therefore, be evident that if industrial peace is the test, Victoria has come more nearly discovering the missing link between capital and labor than has any other modern industrial land.

NEW SOUTH WALES, AUSTRALIA.

The State of New South Wales is an empire in itself, covering an area of 198,635,000 acres or 310,372 square miles, with less than five persons to the square mile, embracing some of the most fertile soil in Australia.

It is much the wealthiest State in the commonwealth, and stands first in Australian agriculture and industrial production, and in its volume of imports and exports; and with a population of about 1,500,000, its wealth and purchasing power per capita ranks second only to that of New Zealand.

In common with Victoria it has an ideal climate and a splendid health record, less than ten deaths per thousand per annum.

A high degree of prosperity has been enjoyed by New South Wales, and there is little of what in the older countries is known as poverty. There are no poor rates and no workhouses in New South Wales.

It is claimed by the Intelligence Department of New South Wales that its citizens are the most lightly taxed people in the world, with, so to speak, no direct taxation, the profit on the government business undertakings practically paying the whole of its annual interest bill.

The wage-earner living in this State, therefore, starts out with many advantages. In addition to these favorable conditions, few governments elsewhere have given greater attention to the amelioration of the condition of the wage-earner, more especially to the unorganized and the weaker industrial workers, than has the government of New South Wales.

The State has no race problems to deal with, as nearly the whole population—ninety-seven and one half per cent—is of British extraction.

WAGES.

In common with the rest of the world, wages during the era of prosperity have tended upward. This has been due partly to a protective tariff policy, partly to the policy of the Labor party, which has been to restrict immigration in order to cause scarcity of labor and consequent higher wages, and partly in the sweated and unorganized industries, to the awards of wages boards and arbitration courts.

From data furnished by State Registrar Addison, I find that in forty-eight occupations, dealt with by the legal authorities, wages have,

through their awards, increased 16.21 per cent. These occupations have been chiefly in the sweated industries.

The average wage per day for unskilled workers is seven shillings to seven shillings and six pence ($1.68 to $1.80) and for skilled workers ten shillings to eleven shillings and six pence ($2.40 to $2.76).

COST OF LIVING.

The cost of living has increased, due largely to the advance in the world price of the great agricultural staples and also to the enhanced value of city lots—carrying with it a consequent increase in rent. It is claimed that the increase in wages has also added to the increased cost of living. This, however, is true only in a minor degree. In manufacturing industries higher wages have been more or less offset by the introduction of greater labor saving machinery.

The Australian protective tariff has also tended in more recent years to add somewhat to the cost of living.

HOURS OF LABOR.

The hours of labor in the building and generality of trades are eight per day. Since the enactment of labor legislation, the hours in sixteen occupations have been reduced from an average of seventy per week to an average of fifty-six and one half per week.

These sixteen occupations include such as drivers of bakery and milk wagons, hotel and restaurant employees, ferry employees, brewery hands, shore drivers, and firemen.

Among these, for example, were such extreme cases as drivers of bakery wagons, whose weekly hours were reduced from seventy-six to sixty; ferry employees whose hours per week were reduced from eighty to sixty, and shore drivers and firemen, whose weekly labor was cut down from eighty-four hours to forty-eight.

RELATIONS BETWEEN EMPLOYERS AND THEIR MEN.

Opinions conflict on this point. Many employers state that the relations are strained and unfriendly, while labor leaders express the view that relations are cordial and harmonious. My own opinion is that the relations between employers and their employees are far more friendly and cordial than they are on the continent of Europe and in some parts of the United States, and more cordial than those in England except in the branches of English industries where disputes are settled by voluntary conciliation and arbitration.

LABOR UNIONISM.

The effect of labor legislation in New South Wales, according to Attorney General Hughes, was to increase union membership from seventy-five to one hundred per cent. The report of the Government

Statistician for 1907 shows that there were registered in that year 136 labor unions, with membership of 92,230.

It is explained that these figures do not represent the position of unionism, since all unions do not register, and that particulars of unregistered unions are not available.

STRIKES.

There are no official records kept of strikes in New South Wales. The following record was furnished me by Registrar Addison from his private files. The total number of strikes since 1901 was as follows:

1901	2	1906	29
1902	12	1907	52
1903	11	1908 (first 3 months)	33
1904	11		
1905	36		186

Fully half of these strikes occurred among men engaged in mining.

Out of the foregoing number there were the following instances where employees struck after having obtained, and during the existence of an award of the court of arbitration in an industrial dispute to which they were parties, and as a refusal to obey an award:

1904	2
1905	1
1906	1
1907	8
1908	1
	13

One of these instances was in the case of wire netting workers; one in the case of sawmillers; five of wharf laborers, and coal lumpers, and the remaining six cases were miners.

EMPLOYERS' ORGANIZATIONS.

Employers in New South Wales are but little organized, and in the nature of things here can not seem to achieve effective organization.

STATE PROVISION FOR CONCILIATION AND ARBITRATION.

After the great maritime strike of 1891 a Royal Commission was appointed, who recommended that a court of conciliation and arbitration be created, voluntary in character. Parliament accordingly created the desired legal machinery. The law, however, proved a dead letter. In 1895 a legislation of compulsory inquiry was established. Under this law an inquiry was held in the Victory mine trouble. The mine owners, however, refused to abide by the decision and the men were helpless.

In 1901 compulsory arbitration came into effect, modeled after the New Zealand law, with the penalty of imprisonment for violation of the law, but the arbitration court soon became so congested that the act

broke down. This led to a marked change in the law brought into effect at the expiration of the Compulsory Arbitration Act in 1908. A new scheme was devised in the nature of a combination of the wages board system of Victoria with the compulsory arbitration system of New Zealand, that will be referred to more in detail later in this report.

COMPULSORY ARBITRATION.

As mentioned in the preceding paragraph, a compulsory arbitration law modeled after the New Zealand law went into effect in 1901 for a limited period of six years. The act seemingly did not work out as its authors had hoped. It led to intense feeling, more especially on the part of employers, whose sentiments after the act had been in operation for about four years are expressed in the following extract from a paper read by C. H. Austin, Esq., on the New South Wales Compulsory Arbitration Act of 1901, before an Employers' Federation meeting held in 1905:

With such an example as that afforded by New Zealand before us, it would seem folly to expect any more beneficial results to follow the introduction of the compulsory arbitration system in New South Wales. Nor when we look at the facts do we find that its workings there have been productive of such good as to justify its existence. By the Act the power of arbitration in industrial matters is vested in a court composed of a supreme court judge, as president, and two members nominated one each by the industrial unions of the employers and employees, respectively, the three appointed by the governor in council. I should like to say at the outset that although I intend to hold up to view the workings of the Act in all its naked ugliness, it is not my wish to reflect in the slightest degree upon any member of the court. The court was called upon to interpret an Act, illogical in its conception, cumbersome, unworkable, and mischievious in its workings and results. Mortal men in my opinion could not have done better than they have done. For the Act itself I have the greatest abhorrence; for the president and members of the court I have the greatest respect. The court is given power, among other things, to deal with the following "industrial matters":

(*a*) The wages, allowances, or remuneration of any person employed or to be employed in any industry, or the prices paid or to be paid therein in respect of such employment.

(*b*) The hours of employment, sex, age, qualifications, or status of employees, and the mode, terms and conditions of employment.

(*c*) The employment of children, or young persons, or any person or persons or class of persons in any industry, or the dismissal or refusal to employ any particular person or persons or class of persons.

(*d*) Any established custom or usage of any industry, either generally or in any particular locality; and

(*e*) The interpretation of an industrial agreement.

We have the extraordinary spectacle of the highest legal authority in the state (Chief Justice Dooley), with the concurrence of his colleagues, roundly condemning the Act in the following terms:

"It is also beyond a question that the arbitration Act, as in force in this state, is an Act which is in derogation of the common law; it does encroach upon the liberty of the subject as regards person and property; it creates new crimes unknown to the common law or contained in any previous statute. It interferes with the liberty of action of both employers and employees. It precludes the one from giving and the other from obtaining employment except upon terms imposed by the Act. It deprives the employer from the conduct of his own business, and vests it in a tribunal formed

under the Act, and it can prescribe terms of management which, however injurious they may be to the employer, he must comply with, under penalties for any breach of the order of the court. There are many matters to which I might refer, such as the operation of the common rule upon persons who have not been before the court, but it is not necessary to do so.

"Further, I think this Act is productive of the most alarming and deplorable amount of litigation with its concomitant ill feeling and ill will between employer and employee who are by this Act forced into hostile camps. I believe the object of the legislature in passing this Act was to promote peace and good will between employers and employees, but I fear it has not done so."

Against the pronounced wishes of the Labor party, which was most anxious to have the compulsory arbitration measure renewed and made a permanent act, the law was abondoned. In this connection it can not but be of interest to note the attitude in this action of ex-Attorney General Wise of New South Wales, under whose direction and generalship the Compulsory Arbitration Act of 1901 was placed on the statute book. The following is his statement:

The object of the Compulsory Arbitration Act was to make bargaining collective; therefore, under the Act, trade unionism was made the industrial unit. For this purpose, unions were given power under the Act to make contracts and sue members for fees and the court was give power to grant preferences to unionists in the giving of employment, provided the union limited its right to strike, and its rules were approved by the registrar so that it might not become a close corporation. This implied that only the union could set the Act in motion on behalf of the men.

The Act further provides that industrial agreements made between employers and men and approved by the court should be enforceable so that penalties could be recovered for a breach. The award to hold for two years.

More than two thirds of the industries of the state, including thirty different trades employing 150,000 men, were working under industrial agreements.

In June, 1905, the high court held that industrial agreements could not become a common rule; that is, could not be made to apply to the trade generally. The Act was not amended to cover this weak spot and the most useful part of the measure went by the board.

A further result was that the industries which had been regulated by agreements now rushed to the court, causing great congestion and final breakdown of the tribunal.

Several other decisions were given which hampered the operations of the court without the necessary amendments being made to the law. Whereas in New Zealand the Act was amended seven times in the first five years of its existence.

EFFECTS OF THE ACT.

For the first five years there were no strikes. There were a few spasmodic outbursts in later years, owing to the impossibilities of getting cases heard. The case of the New Castle unions, for example, was in court four years before a hearing was obtained, and even then a special tribunal had to be appointed. Even in the three or four actual strikes, all in coal mines or maritime trade, no support was given the other unions. The system killed sympathetic strikes.

By establishing a minimum wage it abolished sweating, and it strengthened unionism by establishing a preference for unionists in about half the awards.

The congestion of business, the overloading of the arbitration court with motions for penalties which should have been heard by magistrates or by the registrar, caused a final breakdown of the judicial machinery, the hostile administration in power rendering no assistance due to its policy to destroy the Act.

The Act, however, established the principle that the public has the same interest in checking industrial disputes as in preventing street brawls. The proof of this is

that even the opposing political party on getting into power adopted all the essential principles of the Act, and which are now in force, simply changing the method.

I never contended that the Act would absolutely prevent strikes, its purpose being to prevent strikes and lockouts, and to compel both parties to operate, if they *do* operate, in accordance with the award. But there was nothing in the law to compel men to work or employers to keep their shops open if the award was *not* satisfactory to them.

Ex-Attorney General Hughes in this connection said:

The old New South Wales compulsory arbitration law made distinctly for industrial peace. It prevented any serious industrial outbreaks during years of great prosperity when labor was well organized. Under ordinary conditions there would have been conflict.

Chief Secretary Wood said:

Compulsory arbitration meant congestion and delay by appeals, and it had a tendency to widen differences and cause an increased unfriendly feeling between master and men.

The possible point of failure in compulsory arbitration is the inability to enforce decisions against a large body of men.

Registrar Addison in this connection said:

As proof that the compulsory arbitration law did not, and does not, contemplate the enforcement of its decisions, the record is cited that between June, 1904, and June, 1908, there were thirteen cases where men struck work after the court award, refusing to obey the awards. In only one instance were the men brought into court—that was in Rhonda, Northumberland and Northern extended mines—and the decision on a technicality was in their favor, on the ground that their agreement with their employers did not stipulate that notice to quit work must be given. The award, it was claimed, simply established the point that if they returned to work they must do so on the terms of the award. Nothing in the award could prevent them from exacting better terms if, having a monopoly of labor, they could do so.

Prime Minister Wade, on being invited to express his opinion on the recent Arbitration Act, said:

The Compulsory Arbitration Act resulted in congestion of cases. The long wait of one and two years for decisions led to labor unrest, resulting in numerous strikes. Under the compulsory arbitration law cases were manufactured because of the desire to take advantage of the ignorance of the assessors.

Preference, as a rule, being given under the awards to unionists, union membership was increased and used for political purposes.

Prompt action in labor disputes is most important. But under compulsory arbitration law, there were two possible appeals from the judgment of the industrial court, first to the full court, and then to the high court.

To convict for violation of an award meant a jury trial with but rare instances of conviction. Under our new Act there is no delay. The board consists of experts and appeals are cut out by confining finality to the industrial court, which has power to act summarily.

The crown initiates the prosecutions for violations of the wages boards awards.

Judge Heydon, president of the industrial court, said:

The real objection to the old compulsory arbitration court was the fact that the court was congested. Provisions against strikes were severe but ineffective. The strike in the New Castle coal mine showed the law to be useless. The tendency of the arbitration court was to raise wages. The court was a boon, as are the present wages boards, to the "sweated" workers.

In this connection I am prompted to quote the following extracts from a letter written by Judge Heydon in October, 1907, to Henniker Heaton, Esq., M. P.:

There is a good deal of confusion of thought in the public mind as to the objects to be obtained by the introduction of compulsory arbitration in industrial matters. * * * Properly speaking, however, the objects aimed at are (1) the prevention of sweating, and (2) the prevention or limitation of strikes and lockouts.

Of these the former is of much easier attainment, and is free from most of the difficulties with which the second is beset. The sweated classes are, as a rule, the weak classes, who can do little or nothing for themselves. In their case the tribunal becomes one exercising protective function, and the statute creating it and clothing it with the necessary powers is related to the measure by which the conditions in factories, the labor of women and children, and the closing time of shops is regulated. Taken altogether, they amount to no more than the imposition on the competing industrial capitalists of conditions subject to which their competition is to be carried on, conditions intended to protect the weak, and in the interest of society and humanity to prevent them from being ground down in the cruel mills of intense competition. An industrial arbitration act going only so far as this can hardly be called by any one a socialistic measure. If it is, then the other legislation to which I have referred is also socialistic. It no more discourages individualism and prevents competition than did the law that prevents the competitor from killing his rival. It permits competition and encourages individualism by giving to the competent enterprising employer the full reward of his industry, but, in the interests of the community, it lays down certain laws subject to which competition must be carried on.

I think that it can be said with considerable confidence that in this aspect of its operation industrial arbitration has, in Australia and New Zealand, come to stay, and will remain a permanent feature of our social life. The employment of men and women under cruel condition and for grossly insufficient wages is most repugnant to public sentiment. We are united in a strong desire to prevent it, and nearly every one is reconciled to the idea of preventing it by means of a tribunal whose decisions shall be binding.

The second object of compulsory industrial arbitration is much more difficult of attainment. To forbid strikes, and compel industrial disputants to come to a court, and to clothe that court with power to regulate, by a compulsory decree, the conditions that prevail in every industry in which the parties are unable to agree of themselves, is to intrude into a totally different sphere. If there are weak classes likely to be imposed upon, and in the ordinary sense of the term, sweated, and to whom it is in the highest degree just that a fair living wage should be awarded, there are also strong unions able, without the assistance of any tribunal, to win for themselves terms which rise as far above a fair living wage as those of the sweated classes fall below it. To take away from those men the weapon of the strike, and to impose upon them the compulsion of a peaceful award is to enter at once upon difficulties of the gravest character. They consider that they have (as indeed they clearly have) the right to the best wages they can get, and any court which imposes on them a wage which in their opinion is smaller than that appears in their eyes, unless they have the fullest confidence in its personnel, is an unjust tyrant.

In the humanitarian function of the court, first mentioned above, it is evident that there can be no question of compelling the worker; he is only too glad to get from the justice of the community the relief which he can not win for himself. Compulsion, therefore, must bear upon the employers, but a man has really no more right to carry on business by paying a sweating wage than by paying no wage at all. Other employers usually welcome the introduction of a uniform rule, which enables them to pay a fair wage by compelling their competitors to pay it.

A battle royal took place in the New South Wales legislative assembly when a new bill was brought in by Premier Wade in March, 1908, pro-

viding for wages boards supplemented by an industrial court, in lieu of a compulsory arbitration court, which had ceased to exist by the termination of the act created for six years in 1901.

The Labor party fought against overwhelming odds to retain compulsory arbitration with its preference to labor unionists and its limitation of apprentices, but was finally defeated. I quote the following from the speeches delivered on that occasion by Premier Wade, which give a most interesting and comprehensive résumé of the points of failure of the old act and the essential features of the new measure.

ARBITRATION COURTS.

INDUSTRIAL DISPUTES BILL.

(Extract from speeches by Premier Wade.)

Page 2: We have taken as far as we can the legislation of adjoining states and countries, and from our experience of the past, introduced elements which may tend to make more perfect the purposes which we have in view.

Pages 3-4: In the first place the compulsory arbitration court, in their anxiety to be seized of all the history of the particular trade before them, spend a large amount of time in being initiated and taught the elements, the A B C of the trade. With these two preliminary difficulties—first of all, the want of knowledge on the part of the court leading to the loss of time in the educating of themselves in regard to the trade, and the further loss of time involved by putting forward claims of an extravagant and baseless nature, there has been an enormous amount of time consumed in an unprofitable and expensive manner.

Page 5: The inexperience of the court, the extravagance of the claims made, and the presence of the legal fraternity led to an immense prolongation of nearly every case that came before the court. The result was necessarily an increase in expense, which became very heavy in some cases. We find that during the first twelve months of the life of this court it dealt with only eleven disputes, which were all prolonged and some to a very great length. But at the end of a year there was a list of something like seventy cases which had accumulated and were waiting determination by the court.

Page 6: The court was, I might say, rushed with claims from industries of all descriptions advancing grounds for redress at the hands of the court. I have actually heard it stated on the part of more than one industry that their real purpose was to secure preference by the court, that their condition of life was not so bad after all. When the unions saw that whether they achieved success or not in the way of an increase of wages, they, at all events, had the opportunity of having the preference clause granted them by the court, there was naturally a rush by all the industries that could do so to come before the court, and if possible obtain that result. * * * Under these circumstances, by a particularly simple method, which was not for a moment contemplated by those who formed the act, the opportunity was given the labor unions to strengthen their political organization with the disastrous results to the arbitration court as an industrial tribunal of congesting its work in a most deplorable way. The very first we ask for in any useful tribunal is a ready access to that body in the case of trouble. It is no use to be told, "Lay down the weapons of a strike; stop your lockout; when trouble arises, go before this tribunal of peace, which will deal with your case promptly and without delay." What is the good of that cry, what is the use of the remedy, when you find in the case of trouble that those unions which have a real substantial grievance can not expect redress unless they wait for one, or, possibly, two or more years? It is hardly to be wondered at under these conditions that there might be a union with a real substantial grievance which could not approach the court, and in despair took the alternative of trying to redress things in its own way.

WAGES BOARDS.

Page 20: The main points we make for this proposed wages boards bill, as I say, are expedition, simplicity, finality and determination by a body of experts.

Page 27: A separate tribunal is appointed by the bill to carry out the other necessary conditions of the statute which is to enforce those awards and to punish for breaches of them. And it is obvious that when you have boards, all of which consist of lay members without legal experience, and the necessity of many of them having as their chairman a layman also it would be unwise to provide that that same body, possibly of laymen, too, should have the power of enforcing awards, inflicting penalties, and possibly imprisoning persons convicted before them; and there is the further anomaly that when you have a board, or, what might be called a bench, composed of employees and employers, it would lead to endless friction and disastrous results if it were possible for the employees to send their employers to goal by their award, or if the employers sent to goal their employees who might possibly have been working in harmony with them on the same board a short time before, so it became essential to make this broad dividing line: to have the making of the trade conditions in the hands of the boards, and to have some other tribunal as a body to enforce these awards when made.

"CLOSED SHOP."

The law goes no further than to say that it shall not be obligatory to grant any preference in its awards to members of unions. It leaves the point to be determined between the parties. In consequence, there are some unions, notably in the hat industry, that refuse to allow their members to work with nonunionists in the same industry. These, however, are exceptional cases. As a rule, union and nonunion men work side by side.

EFFECT OF STATE INTERVENTION ON CAPITAL IN INDUSTRIAL ENTERPRISES.

The opponents of State intervention in labor disputes maintain that such intervention has made for the driving out of capital and the discouragement of industrial undertakings.

A recent writer on this point says: "While some capital may have been frightened away because of state labor legislation, such legislation has actually given a feeling of security and permanency to industry consequent on its having rendered serious strikes improbable. As these facts become more generally known, it will be conducive to inviting the investment of foreign capital."

The following facts taken from the latest government report, 1909, do not substantiate the charge that State intervention in labor disputes affects industrial growth unfavorably:

Manufactories 1903	3,476	
Manufactories 1907	4,387	
Increase		911—26.20 per cent.
Hands employed 1903	66,269	
Hands employed 1907	87,194	
Increase		20,925—31.57 per cent.

WAGES BOARDS.

The act adopted in April, 1908, in lieu of the compulsory arbitration act of 1901, which had expired by limitation, bears the title of "Industrial Disputes Act of 1908."

Briefly, it includes a schedule of about eighty industries, and provides that on application of employer or employers of not less than twenty employees, or a trade union registered under the act having a membership of no less than twenty employees, or, in the absence of an existing trade union, twenty employees of an industry, the industrial court may recommend to the minister that a board be constituted for such industry. Or, without any application, the minister on recommendation of the industrial court may direct a board to be constituted.

Each board consists of a chairman and not less than two nor more than four other members, one half employers and the other half employees who are or have been engaged in the industry.

The appointment of the members is made by the governor on the recommendation of the industrial court, which, as a rule, accepts the nominees of both parties, or in the event of the parties failing to nominate, makes its own recommendation to the governor.

Where the parties agree on a chairman, such party is nominated by the court. Failing to agree, the governor appoints a supreme or district court judge, or some person nominated by the court. The chairman, in his discretion, may appoint two or more assessors representing both sides to advise on technical points, but without voice on the board. Members of the board and assessors are sworn to secrecy on penalty not to divulge any evidence relating to trade secrets; the profits or losses or the receipts and outgoings of any employer; the contents of books of an employer or witness produced; the financial position of any employer or witness. The members of the board hold office for two years. The governor fixes the fees paid board members and assessors.

Proceedings are commenced before a board, by reference to the board by the industrial court, or, by application, to the board by employers or employees. The board has the power to—

a. Decide all disputes;

b. Fix the lowest prices for piecework and the lowest rate of wages payable to employees;

c. Fix the number of hours and the times to be worked in order to entitle employees to the wages so fixed;

d. Fix the lowest rates for overtime and holidays, and other special work;

e. Fix the number or proportionate number of apprentices, and the lowest prices and rates payable to them;

f. Appoint a tribunal for the granting of permits allowing aged, infirm or slow workers to work at lower than regular wages;

g. Determine any industrial matter;

h. Rescind or vary any of its awards.

The decisions of the board, subject to an appeal to the industrial court, are binding on all persons engaged in the industry within the locality specified for the period fixed by the board, not less than for one nor greater than three years. The board may conduct its proceedings in public or in private, at its discretion. It may exercise in respect to witnesses and documents and persons summoned, giving evidence before it, the same powers conferred on a committee of elections and qualifications. An employer's books may be called for only in the event of his claim that the profits of his business are not sufficient to enable him to pay the wages or grant the conditions claimed.

No advocates are allowed to appear before the board without the consent of the chairman. Decisions of the board, if not presided over by a judge, may be appealed from to the industrial court within one month by any trade or industrial union, or by any person bound or intended to be bound by the award. The industrial court only may rescind or vary any award or order made by the board. It may also cancel or vary any recommendation made by it. An employee may apply to the industrial court within three months for an order to recover from the employer the full amount of any balance due for wages as fixed by the board, notwithstanding any smaller payment or any express or implied agreement to the contrary. Such order is deemed a judgment for the amount.

PROHIBITION OF LOCKOUTS OR STRIKES.

If any person does any act or thing in the nature of a lockout or strike, or suspends or discontinues employment or instigates to or aids in any of the above mentioned acts, he is liable to a penalty not exceeding one thousand pounds ($4,850) or in default to imprisonment not exceeding two months. Nothing, however, prohibits the suspension or discontinuance of any industry or the working of any person therein for any cause not constituting a lockout or strike. Any person committing a breach of an award of a board or of the industrial court is liable to a penalty not exceeding fifty pounds ($242.50), and in default of payment to imprisonment not exceeding three months, or for a willful act or default of the person charged, the court may in lieu of such penalty imprison for not exceeding three months.

To dismiss an employee because he is a member of a board or a trade union, or for any other reason, having in view the evasion of an award, lays the employer liable to a penalty not exceeding twenty pounds ($97.00) for each employee so dismissed. In every case it lies with the

employer to satisfy the judge that such employee was dismissed by reason of some facts other than those mentioned. Proceedings for any offense against the provisions of the act are taken before the industrial court, and are heard and determined in a summary manner.

The court may order a trade union to pay out of its funds any amount not exceeding twenty pounds ($97.00) of the penalty imposed upon any of its members, unless it can be shown by the union that it exercised every reasonable effort to prevent its members from going on strike or from taking part in a strike or instigating or aiding a strike. The decision of the industrial court is final.

Employers and employees must give at least twenty-one days' notice of an intended change affecting conditions of employment with respect to wages or hours. During the proceedings before a board, neither party can alter the conditions of employment with respect to wages or hours. "Statu quo" must be maintained. The foregoing, in substance, are the salient points of the law enacted in April, 1908, and amended in December, 1908, and known as the "Industrial Disputes Act of 1908." It will be noted from the foregoing provisions of the New South Wales industrial dispute act, that practically it is the Victorian wages board system described in my preceding report, combined with certain features of the New Zealand compulsory arbitration act. As a matter of fact, Premier Wade, the framer of the act, stated that he had taken as far as he could the legislation of adjoining states and countries with the view of making the act more perfect for the purpose in view.

At this writing the act has been in operation less than a year. It is, therefore, altogether too early to determine how nearly it is likely to achieve the results aimed at by its framers, in establishing a higher degree of industrial peace than was achieved under the compulsory arbitration law of 1901.

ATTITUDE OF LABOR COUNCIL.

The Labor Council of Sydney received the act in the most unfriendly spirit. It was hostile to the measure because (*a*) it did not provide for preference in employment to unionists; (*b*) it did not limit apprenticeship; (*c*) it provided that any twenty nonunion employees could collectively unite in asking for a wages board, thus, in the opinion of the Labor Council, making against unionism. The council agreed that if nonunionists could secure wages boards there would be no incentive for men to join unions, when without a union they could get the desired awards. Accordingly, the Labor Council passed a resolution calling upon the unions to refrain from registering under the act with the view of making it a dead letter and defeating its purpose.

Unionists soon found, however, that the fears of the Labor Council were groundless. In no instance thus far have applications for wages

boards been made by nonunionists and unionism has continued to grow. Union members soon discovered that the law afforded advantages to labor in the way of establishing fair working conditions and the prevention of sweating that labor could not afford to ignore, so that despite the condemnatory resolution of its own council, unions have steadily been registering under the act and making the fullest use of the legal machinery provided for the betterment of labor conditions and the settlement of labor disputes.

The official record on April 7, 1909, as furnished me by Premier Wade, stood as follows:

Number of labor unions registered under the act of 1908	59
Number of applications for boards	62
Number of boards appointed	36
Number of determinations of boards	18
Number of boards sitting	4
Number of hearings not yet begun	13
Greatest number of boards sitting at one time	12

Since leaving Sydney I have been informed that the Labor Council has rescinded its resolution against the wages board act, having realized that it is not proving disadvantageous to unionism. On the contrary, the unions have found the following advantage under the new act, which they seem to value highly and which they did not enjoy under the compulsory arbitration act.

Under the old act unions could get judgment against members for unpaid dues, but found it almost impossible to collect such judgments. Under the new act unions can get judgments from a district court, with power to garnishee or attach wages or levy on the property of a delinquent member, with the penalty attached of imprisonment in default of payment.

Despite the fact that the law is yet in its infancy, and too young to pass upon it any definite judgment, evidences would indicate that it is likely to prove successful. We have seen that, despite the hostile attitude towards it in the beginning on the part of the Sydney Labor Council, unions were not slow to avail themselves of the benefits it affords and that out of about eighty industries scheduled in the act as entitled to wages boards, fifty-nine unions registered under the act in the first few months of its existence. On the other hand, employers have expressed to me the opinion that in their judgment the wages boards system is making for industrial peace, and that it is a far better system than and a great improvement on compulsory arbitration, pure and simple, since it prevents congestion of cases (Premier Wade stated that thirty cases had been disposed of in the first eight months of the act), brings the knowledge of experts to bear on disputes, and tends to bring employers and men together, making for the wiping out of prejudices

and the creation of more cordial relations, the decisions of the boards, as a rule, having been generally accepted.

The secretary of one employers' association said that the wages boards are bringing about a higher degree of industrial peace, and the secretary of yet another employers' association made the statement that the members of his association were quite satisfied with the New South Wales wages boards law, since they did not provide for preference to unionists.

VIOLATION OF WAGES BOARD ACT.

There have been two important convictions for violating the provision against strikes and lockouts since the act went into operation. The first was against the Lithgow Iron Works, who were convicted and fined by the industrial court on March 13, 1909, in the sum of $250 and $55 costs for a lockout; and the second case was that of the union of rock-choppers, the secretary of which unlawfully instituted a strike which led a number of men in the employ of the metropolitan district water supply and sewerage board to discontinue their work. Prosecutions were instituted against one hundred and eighteen members of the union. The cases against the officers of the union charged with instigating the strike were heard. The two secretaries and the executive officer were fined $150 each or six weeks' imprisonment, and the president of the union was fined $200 in default of two months' imprisonment.

THE MINIMUM WAGE—DOES IT MAKE FOR THE DEAD LEVEL?

Despite the fact that New South Wales employers welcome the wages boards in preference to compulsory arbitration, many of them contend that the minimum wage which it establishes tends to create the dead level among workmen and to diminish output by pulling the efficient worker, by virtue of his wage being cut to the minimum, down to the level of the less efficient worker.

My investigations have led me to the conclusion that where employers stand upon the letter of the law and reduce the wages of the more efficient men down to the legal minimum, it tends toward the dead level, and makes for deadening the ambitions of such workers.

In the industries where unskilled labor is employed, due to the fact that the law has established a fairly high minimum ($1.75 to $1.87 per day) which, considering the greater purchasing power of money here, is fully as high if not higher than the average wage paid unskilled labor in the United States, the minimum, as a rule, becomes the maximum wage. The incentive for efficiency largely remains, however, even among unskilled workers, due to the desire to retain employment, employers naturally giving the more efficient workers a preference.

In the skilled trades, however, I found that few intelligent employers stand upon the letter of the law and cut the wages of highly efficient men down to the minimum.

At my request Premier Wade had compiled from the factory schedules on file with the Chief Factory Inspector, the figures showing the actual wages paid in registered factories. From the following table it will be seen that the law does not make for the dead level and that aside from foremen, over fifty-one per cent of adult workers receive more than the minimum wage fixed by law, showing clearly that the merit system largely prevails and that employers differentiate between their workers, thus offering an incentive for higher efficiency and a larger output.

PREMIER'S OFFICE, SYDNEY, 5th June, 1909.

DEAR SIR: I have endeavored to secure the information you asked for with regard to the minimum wage. The particulars, however, are not collected in that detailed form which makes deductions allowable. Only a rough calculation is possible under the circumstances, which I scarcely like to put forward as being able to stand the test of examination.

The information so far is collated in respect of adult workers only—that is, foremen are excluded, also workers under twenty-one years of age, as well as old, slow workers who work for less than the minimum wage. However, I think the information is so far reliable as to prove that a proportion of workers, under awards of the court, do receive more than a minimum wage.

I forward a table that has been prepared. I think it would be wise to take it as correct on general lines and not to be relied on in detail until there has been opportunity of going into the question more thoroughly and at greater leisure.

Yours faithfully,

(Signed.) C. S. WADE.

COLONEL H. WEINSTOCK,
Special Labor Commissioner for California.

MINIMUM WAGE—ARBITRATION COURT AWARDS.

Industries.	Receiving minimum wage.	Receiving over minimum wage.	Not classifiable.	Proportion receiving above minimum wage.
Tanners	113	350	28	75.6 per cent.
Brickmakers	672	139	136	17.1 per cent.
Sawmills	330	197	118	37.4 per cent.
Ironworkers' assistants, Engineers (ironworks), Stovemakers	729	251	99	25.6 per cent.
Wire netting workers*	----	----	----	----
Bakers	652	321	189	33.0 per cent.
Cold storage employees	52	14	20	18.4 per cent.
Tailoresses	187	1,011	9	84.4 per cent.
Boot employees	747	495	171	39.8 per cent.
Pressers (clothing)	76	33	----	30.3 per cent.
Saddlers	77	80	11	51.0 per cent.
Furniture makers	99	306	35	75.5 per cent.
Wire mattress workers	11	30	17	73.2 per cent.
Gas employees	47	816	154	94.5 per cent.
Laundries	353	343	23	49.3 per cent.
Brushmakers†	----	----	----	----
Total	4,145	4,386	696	51.4 per cent.
Total of minimum and over minimum wage				8,531

* All on piecework.
† Great majority on piecework.

CONCLUSION.

The experience of New South Wales with its labor legislation is of profound interest to the investigator because of its progressive character. While it is yet perhaps in an experimental stage, it has made important strides along the line of achieving the results aimed at, namely, the abolition of sweating and the maintenance of industrial peace.

In the beginning, it created legal machinery for the settlement of labor disputes by voluntary conciliation and arbitration and in common with other states and countries found it inefficient. It then went to the other extreme and created a most drastic compulsory arbitration law. This, also, it found largely ineffective, due to inherent defects in the law that tended to friction, delay and great difficulty in enforcing court decisions. Profiting by these experiences it sought a happy medium by creating wages boards, where employers and employees can be brought together under favorable and friendly conditions with every incentive to come to a voluntary understanding which is legalized by the court. In the event of a failure to do this, it is made possible to reach a conclusion by the intervention of an impartial chairman, which conclusion is likewise legalized by the court, which under the law is given power to enforce the decision. In this wise, a way has been found not only to minimize the evil of sweating, but also to reduce possible strikes and lockouts to the fewest number. The record of the first eight months of the operations of the act is encouraging.

The awards of the wages boards have generally been accepted, with few, if any, appeals to the court. Violations of the law have been promptly and summarily dealt with by the court, and the claims and counterclaims of the employers and employees have had a prompt and expeditious hearing.

Doubtless weak spots in the act that will need attention will show themselves as time goes on; but with the present favorable attitude toward the measure on the part both of employers and wage-earners, no difficulty should be experienced in strengthening such weak spots in an equitable manner with justice to employers and men.

AUSTRALIA.

Australia is primarily an agricultural and pastoral country. In 1908 the area under crop was 9,355,052 acres. The estimated value of production from industries in 1907 was as follows:

Agriculture, including pastoral	$469,218,000
Manufactures	182,239,000

It will be seen from these figures that agriculture produces more than two and one half times the value of manufactures in Australia and is likely to continue doing so for an indefinite period. The sparseness of its population—about 1.37 persons to a square mile, or 4,197,037 people in a country with an area of 2,974,581 square miles, making it substantially as large as the United States—makes it hardly possible to maintain manufactories on a scale successfully to compete with the great industrial countries of the world. In 1907, manufactories had grown sufficiently large, however, to keep busy 12,555 factories, employing 248,841 hands.

STATE EFFORTS IN BEHALF OF WAGE-WORKERS.

For the past thirty-five years the Australian governments have given much attention to the condition of its factories workers, the first factories act having been passed in 1873. Much of this has been due to the efforts of trade unions, whose history in Australia dates back to 1859.

In this connection the official Yearbook for 1909, page 1048, says:

DEVELOPMENT OF TRADE UNIONS IN AUSTRALIA.

Each state in the commonwealth, it may be said, has enacted with more or less elaboration, legislation respecting trades unions and respecting regulation of the conditions of industrial life, particularly those of factory employment; and each state, except Tasmania, has regulated the hours of business for the great majority of shops. Some of the states have also established machinery for the regulation of wages, as well as of other matters connected with employment.

At the present time there is an obvious tendency to adjust such matters throughout Australia on uniform lines. The industrial conditions of any state in the commonwealth naturally react quickly on any other State. This is one of the consequences of a unified tariff, and of the fact that the general economic conditions of any one part of the commonwealth must necessarily affect any other part. An expression of the intimacy of these economic and industrial relations of different parts is seen, for example, in the refusal of the arbitration court in New South Wales to fix the wages in the boot trade at a higher rate than that fixed by the wages board in Victoria, because of the additional burdens that such a rate would place on local manufacturers.

LABOR IN AUSTRALIAN POLITICAL LIFE.

Speaking of the part played in the political life in Australia by labor unions, the same authority says, pages 1051-2:

It was during the decade 1880-90 that the trades unions of Australia espoused direct legislative representation and advocated state interference between employer and employee. This policy has been called "new unionism." A resolution affirming the desirability of parliamentary representation of labor being passed at the congress of 1884, a number of members representing the special interests of the wage-earners were elected to the legislatures of several states, but the unions took no steps to obtain representation by men chosen from among their own ranks until after the great labor trouble of 1890-92. In that time serious strikes occurred in the maritime, shearing, and mining industries, and it was then that the Labor party proper was formed, though a certain amount of ameliorative legislation had already forced its way into the statute books of the states. Since 1890 the party has considerably influenced Australian politics. In the year 1904 a labor government occupied the commonwealth treasury, and again in December, 1908, a second labor government took office. The second Deakin ministry had the support of the Labor party. In South Australia the premier is a direct labor representative. In Queensland a third of the House of Representatives are labor members. In New South Wales the election of 1907 strengthened the party, and it is now an important element in Parliament. Victoria and West Australia have also elected a considerable number of direct labor representatives.

Under the heading of "Limitation of Hours" the Yearbook, 1909, says, page 1056:

As already remarked, the adoption of the eight-hour system for adult males has generally been the outcome of the representations made by the trades unions. Except in New Zealand, there is no general legislation to enforce the principle, although there is now a general recognition of it. A week of forty-eight hours is the usual working week. The larger unions, however, have lately moved for a net day of eight hours with Saturday a half-holiday, no loading of other days being permitted as compensation for Saturday afternoon. Under this scheme there are for five days equal divisions for periods of work, recreation and rest, and four hours' work on Saturdays, making a working week of forty-four hours. In the majority of occupations forty-eight hours weekly is the recognized limit of work. On the establishment of wages boards and arbitration courts, in the states where those institutions exist, the authorities thus created adopted the rule as a part of their determinations and awards whenever it was reasonably practicable. In some technical and specialist trades a lower maximum has been fixed, such as, for example, the typesetting machine operators in Victoria, for whom the maximum has been fixed by the wages boards at forty-two hours weekly. Reasonable provision is made by statute or award for work performed outside of the scheduled hours. Organizations of employees, however, oppose overtime in any industry until all the operatives in that industry are working full time.

In speaking of "Labor Legislation," the Yearbook, 1909, says, page 1064:

Two systems, based on different principles, exist in Australia for the regulation of wages and general terms of contracts of employment. A "wages board" system exists in New South Wales, Victoria, Queensland, and South Australia, and an arbitration court in West Australia. In New South Wales industrial arbitration act of 1901-05 instituted an arbitration court. This court expired on the 13th of June, 1908, having delivered its last judgment on the previous day. Wages boards were substituted under the industrial disputes act of 1908. There is also the arbitration court of the commonwealth which has power, however, to deal only with matters extending beyond the limits of a single state.

In 1904 the Commonwealth Parliament enacted a law known as the "Commonwealth Conciliation and Arbitration Act," having for its end a system of compulsory arbitration for all interstate labor disputes, with the view of preventing strikes and lockouts.

The provisions of the act, in brief, are as follows:

The court has jurisdiction for the prevention and settlement of interstate industrial disputes, with power to conciliate with the view to amicable agreement between the parties, failing in this, to make an equitable award.

The states may refer industrial disputes to the court, and permit the workings of the court and state industrial authorities to aid each other.

The law forbids interstate strikes or lockouts, subject to a penalty of £1,000 ($4,850). The award of the court is binding on all parties to the industrial dispute.

Assessors, one each representing employers and employed, may be appointed by the court for the purpose of advising it in relation to the dispute, and to discharge such other duties as the court may direct. The court has power to fix maximum penalties for any breach or nonobservance of an award, not exceeding £1,000 ($4,850) in the case of an employer or an organization, £10 ($48.50) in the case of an individual member of an association.

Power is also given the court to summon before it parties to the dispute and witnesses and to compel the production before it of books, documents and things for the purpose of reference only as to matters that relate to the dispute.

The court may prescribe a minimum wage and appoint a tribunal which shall have the power to fix a lower rate in the case of workers who are unable to earn the prescribed minimum wage.

It may direct that other things being equal, a preference be given to members of labor unions.

In addition to the monetary penalty imposed, the court has the power to deprive those failing to observe an award, of all rights and privileges under the act, and to any official position in any organization interested in the award, and all existing or accruing rights to any payment out of the funds of any organization interested in the award.

Fines, fees, levees or dues payable to any labor union by any member may after registration be sued for and recovered in the name of the organization in any court of summary jurisdiction.

We have seen that the various Australian states have their separate labor legislation. The commonwealth industrial court being empowered to deal only with cases that affect more than any one state. In this connection the Yearbook for 1909, says:

THE NEW PROTECTION.

The wide difference between the developments in the several states of the commonwealth of the regulation by state institutions of the remuneration and conditions of the worker has given rise to the desire on the part of the commonwealth government to secure uniformity throughout Australia by any suitable and constitutional action on the part of the commonwealth. The provisions of state wages laws vary considerably. In New South Wales, Victoria, and West Australia some experience has been gained of their working. The wages board system is new in South Australia and Queensland. Tasmania is without legislation. The desirability of uniformity has, as already mentioned, been recognized by the New South Wales arbitration court, which refused the bootmakers' union an award which would increase the wages of its members to amounts exceeding those paid in Victoria in the same trade, the expressed ground of the refusal being that New South Wales manufacturers would be handicapped by the payment of a higher rate of wage than that prevailing in Victoria. This attitude can not be made effective by the arbitration court of the commonwealth, which has jurisdiction only over industrial disputes extending beyond the limits of any one state.

This desire on the part of the government, backed as it is by the labor unions, is being strenuously opposed by employers and by the advocates of state rights; the former because on principle they are opposed to compulsory arbitration, and the latter because they fear too great a centralization of federal power.

The Australian federal law is substantially the same as that of New Zealand. The cardinal principle in both laws is that labor loses the right to strike and the employer loses the right to lockout, and that the court has the plenary powers to summon before it the parties likely to cause industrial strife. It postulates organization. The men especially must organize, hence, the law makes for unionism.

The commonwealth arbitration law has now been in existence for about four years and a half. The only strike or lockout thus far calling for federal intervention was at the Broken Hill mines, in New South Wales, involving over 4,000 men. In dealing with the decision in this case, I quote from the Melbourne *Herald* of March 12, 1909:

ARBITRATION—BROKEN HILL DECISION.

In the first civil court to-day, Mr. Justice Higgins, president of the Commonwealth Court of Arbitration and Conciliation, delivered his judgment in the case of the Amalgamated Miners' Association of Broken Hill (claimants) against The Broken Hill Proprietary Company, Ltd. (respondents).

The judgment constitutes an arbitration award under the conciliation and arbitration act, and fixes the wages and hours of the men employed by the Broken Hill Proprietary Company at Broken Hill and Port Pirie. * * * The dispute between the company and the men commenced when the directors of the company, on December 7th last, posted a notice at the mine stating that the "present rate of wages, less the bonus," would remain in force on and after December 21st.

The men at once accepted this notification as meaning a reduction in wages. The directors of the proprietary company asserted that the wages as paid on October 31, 1903, under an award by the New South Wales arbitration court were still in force, but that in addition a percentage increase by way of bonus was paid under an agreement made in 1906, and which expired on December 31st last. This percentage increase, which placed the wages on the same scale as that paid by the principal

companies in Broken Hill other than the Broken Hill Proprietary Company was to be withdrawn, as from December 31st, leaving the old wage still in force. * * * His honor said that the dispute was between a union or association registered under the act, employed in the mining industry, and a company which before the dispute employed 4,195 men at Broken Hill and Port Pirie, mostly members of the association. A dispute arose between the Broken Hill companies and the union in 1903, and a state award was made which lasted till 1905. A conference took place in 1906, and an agreement was made between the union and the twelve principal companies, including the proprietary company.

According to the view of Mr. Justice Cohen, as expressed in the Newcastle Wharf Laborers' Union against Newcastle and Hunter River Steamboat Co., Ltd., of New South Wales, as he (Mr. Justice Higgins) understood it, it was the duty of the company, if it objected to the wages of 1907-8, to continue paying the wages till the arbitration court allowed the reduction of wages. * * * But whether this was the true meaning of the federal act or not, the position was that the mine and all its mills and works were closed and silent, and were picketed by the men; that the company had its immense plant and machinery lying idle, and was losing heavily; that employees, over 4,000 in number, had been thrown suddenly out of work and out of wages; that this huge enterprise, with its hundred branches and trades which had been feeding so many other dependent industries, had suddenly become paralyzed; that the shopkeepers, the shipping, the railways, and incidental industries were suffering; that the resources of many families were severely strained. It was his duty now to try to settle the dispute in the interests of the public.

Then followed his decision, which was in the nature of a victory for the men, since he awarded them substantially the wages for which they contended.

The minimum wage fixed in the schedule includes 8s. 7½d. ($2.07) per day for laborers at Broken Hill and 8s. 3d. ($1.98) at Port Pirie, at 10s. ($2.40) per day for miners on wages.

Forty-eight hours to constitute a week's work, overtime to be paid at time and a quarter, and to include all work on the seventh day of any week, on holidays or in excess of ordinary shift time.

The award to operate till December 31, 1910. The court will not order the company to continue working. The higher wages for 1906-8 was declared to be an increase and not a bonus.

"My duty," said Judge Higgins, "is to make such an award as to set the wheels of this mammoth enterprise going again, if it is possible for me to do so with just regard to the human lives concerned."

The first condition in the settlement of this industrial dispute as to wages is that at the very least a living wage should be secured to these employees. The definition of a living wage adopted is the money necessary to satisfy "the normal needs of an average employee regarded as a human being in a civilized community."

On the point that the mine could not be conducted profitably at the higher wage, Mr. Justice Higgins said: "If a man can not maintain his enterprise without cutting down the wages which are proper to be paid to his employees—at all events the wages that are essential to their living—it would be better that he should abandon the enterprise.

"Unless great multitudes of people were to be irretrievably injured, and society was to be perpetually in industrial unrest, it was necessary to keep this living wage as a thing sacred and beyond the reach of bargaining. But when the skilled laborer has once been secured a living wage he has attained nearly to a fair contractual level with the employer, and, with caution, bargaining may be allowed to operate.

"When the proprietary company asks me to fix wages lower than are proper for the industry as a whole, and adduces as a reason that its mine is now poor and becoming poorer, I can not discern either justice or expediency in the request."

Recognizing the catastrophe of a stoppage of the big mine and his responsibility

in the court, Mr. Justice Higgins said it would be untrue to say the award, by fixing the wage too high, caused the stoppage. What would stop the mine would be the deficiency of payable ore.

Of course it was a catastrophe that this mine should be closed down, but such a catastrophe must take place in every mine at some time, and in this case must occur after a very short interval.

The sliding scale of wages, being only possible with a reduction of living wages, could not be put in the award, for to surrender any part of the living wage would be to surrender the vital point of unionist effort on behalf of an employee.

The reduction of expenditure, £33,000 ($160,000) a half year as a result of reducing wages might mean a dividend, but it would have to come out of the workmen's necessaries of life, would be distributed at the cost of the workmen's breakfast tables.

It would not be fair to blame the directors in their difficult position of responsibility to the shareholders for not proceeding with milling and mining on the strength of undistributed profits. He did not feel justified in ordering the company to continue mining under the circumstances.

"It might be," Mr. Justice Higgins held, "that he had power under the act to compel continuance of work at the mine, but he would not exercise such a power except in extreme cases. It was not for the court to dictate to employers what work they should carry on."

TWO SIGNIFICANT STATEMENTS.

The two significant statements in the decision of Justice Higgins are (*a*) that a living wage must be secured to employees, a living wage being defined as "the money necessary to satisfy the normal needs of an average employee regarded as a human being in a civilized community"; (*b*) that, "if a man can not maintain his enterprise without cutting down the wages which are proper to be paid to his employees—at all events the wages that are essential to their living—it would be better that he should abandon the enterprise."

These doctrines will seem to a good many people in the United States and elsewhere as novel and startling, especially where labor unions are not strong enough to fix and to maintain a minimum wage. To those living where the law of supply and demand in the labor market fixes the wage without let or hindrance, and where there is thus no downward limit to wages, it will seem a most radical step for the law to step in and to say to the employer in the matter of reducing wages "Thus far shalt thou go but no farther." To those also who, when times are hard, and to keep an industry going, cut wages below a living rate, it may seem most radical for the law to say that unless living wages can be paid the industry had better be abandoned.

Yet these sentiments expressed in court, and published in the press, created little or no comment in Australia, and were accepted there as sound and proper.

The decision caused much unfavorable criticism among many employers, not because of the foregoing sentiments, but because they maintained that the spirit of the decision and the spirit manifested by the court in the course of the long trial, evidenced a bias in favor of the

employees. The decision also caused disappointment on the part of the employees, because the court did not exercise its discretionary power in ordering the mine owners to resume operations in full on the terms of the award.

CONCLUSION.

The sentiment of many employers throughout Australia was strongly against the commonwealth compulsory arbitration act of 1904. This was demonstrated by various resolutions passed on several occasions by various employers' conventions, from among which I quote the following:

ARBITRATION ACT.

(Extracts from presidents' addresses before the Australian Employers' Federation Conference, 1905, pages 8-9 of the report.)

Dealing with the celebrated arbitration act, I feel that the word "compulsory" should never have been left out, because it is really compulsory arbitration under that statute. It is purely class legislation, and is for the purpose of strengthening the unions. It is an experiment to increase the wages of the workers and to give them better conditions of employment in defiance of the economic laws, and it will, in my opinion as a business man, prove an utter fallacy. This act will never work. We are all anxious for conciliation, but we will not accept compulsory arbitration. Neither will the people. That is clearly proved by the actions of the unions in New South Wales. So long as the wind blows the way they want it to, the act is all right in their minds, but directly the judge decides against them the act becomes a very bad one to their idea. The history of compulsory arbitration in New Zealand and New South Wales leads us to the certain conclusion that it is practically impossible in administration.

The act is a distinct interference with the liberty of the subject, and I am confident that the high court, before which the question will have to be fought, will confirm our opinion.

Regardless of the expressed intention of the framers of the constitution, and of the emphasized opinions of eminent legal authorities that it was ultra vires, the compulsory arbitration bill became an act. It was framed on the pernicious lines of the New South Wales act, which the trying and humiliating experience of that state has shown to be an instrument for the oppression of employers and many employees, a provoker of industrial strife, a great check to progress, and a violation of the very foundations of the principle of British freedom on which our nation has been built up, and which cost our ancestors so much to win. It has further proved itself utterly powerless to enforce decisions under it against any except employers. It therefore perpetrates a national crime against the body politic, of oppression on the one side and license on the other, for there is no appeal, and which if continued must, by the workings of the great moral law, end in disruption and destruction.

(Motion passed by Employers' Federation, page 18, 1905 report.)

That this conference of employers confirm the determination of the various employers' associations not to register under the commonwealth conciliation and arbitration act, as the act is in derogation of the common law, and, in our opinion, is a violation of state rights; and, further, that by so refraining a protest is entered against the act, whereas registration might be taken to be an acceptance of its obligations.

The foregoing sentiments were expressed and resolutions adopted in 1905, shortly after the commonwealth arbitration law went into effect. Four years have since intervened and the disastrous results anticipated have not taken place.

Aside from the expression on the part of a few employers, I found no serious public sentiment in favor of abolishing the commonwealth conciliation and arbitration act.

In my opinion the law as applied to the commonwealth has come to stay in its present or perhaps somewhat modified form. The point has been made that the men will abide by the awards in good times when wages go up but not in bad times when wages are cut. From the attitude of the court, and the sentiment expressed by Justice Higgins in the Broken Hill case herein quoted, it must be evident that should times get harder than they have been during the depression of the past twelve months, there is no likelihood of wages being increased, nor is there a likelihood of wages being legally cut below the minimum or so-called living wage. Hence, there is little probability of the men refusing to abide by the court decisions.

In the event of hard times, the poorest workers are likely to be dropped, and any wage above the legal minimum may disappear. But until the courts and public sentiment in Australia change their attitude, the minimum wage is likely to be maintained by the federal compulsory arbitration court, thus tending to the perpetuation of Australian industrial peace.

Furthermore, state wages boards can not deal with interstate issues, such as maritime matters or the grievances of the waterside workers, an organization extending around the Australian continent, and hence, a commonwealth or federal court is imperative.

Unless, as already stated, unexpected and serious ills, greater than any thus far developed, should manifest themselves, the commonwealth industrial act is likely to remain permanently on the Australian statute books.

NEW ZEALAND.

There is much in New Zealand to remind the Californian of his own state. He finds there the same temperate and salubrious climate, the same mountainous country with great interspersing valleys, the same great areas devoted to grain growing, and to pastoral pursuits. He finds grown in the dominion, only in a limited way, however, the pear, the peach, the apple, the plum, the quince, the apricot, the fig, the walnut, the cherry, the gooseberry, the currant, the strawberry, the raspberry, the orange, the lemon, the lime, the grape, and the banana. Orchard planting is progressing, and if New Zealand had a market for the product of its trees and vines, it would develop into a fruit country that would rival California.

The people of New Zealand likewise remind a Californian of those of his own state. He finds among the New Zealanders the same generous hospitality, the same free, liberal, independent spirit, the same open hand and open mind that characterize the people of the Golden State.

The area of New Zealand, including the north and south islands and the group of smaller islands, is 104,751 square miles. Its present population is approximately 1,000,000.

The land suited for agricultural purposes is estimated at 13,000,000 acres. The dominion has a coast line of 4,330 miles. In point of transit it is located about four days' sail from Australia and on a bee line about seventeen days' sail from San Francisco. In the absence of direct communication with San Francisco, the voyage via Vancouver now takes about thirty days.

New Zealand is first of all a pastoral, then an agricultural country. It also has abundant resources in its mines and forests. It has great quantities of forests and valuable timber lands, and also much mining country. Large gold and coal deposits are found here. The yield of its gold mines thus far aggregates over $357,000,000.

The first settlement of New Zealand was in 1825. There has since been a steady but not phenomenal growth, due to its distance and isolation from great populated occidental centers. Its nearest neighbors, aside from the Australians, are the untold millions of Asia, who, if unrestricted, would doubtless speedily overrun this land that, so to speak, flows with milk and honey.

New Zealand is governed by a lower and upper house and a cabinet, all modeled after the British form of government. The members of the

lower house are popularly elected for three years and receive £300 a year ($1,455). The members of the upper house are appointed by the party in power for seven years, and receive £200 a year ($970).

Unlike the commonwealth of Australia or the United States, New Zealand politically is treated as a unit. The Parliament legislates for the dominion as if but one state.

This, as compared with the other governments just referred to, simplifies matters materially and does not involve the consequent problems of state rights nor arouse feelings of state jealousies.

No one thing that New Zealand has done has commanded for her greater attention abroad than her modern legislation in dealing with labor problems. This country has been bold enough to take the initiative and to do pioneering along new and untried lines, while the rest of the world has stood by and with great interest looked on. Her greatest fame has come from the enactment of what has become known as the compulsory arbitration laws, having in view (*a*) the wiping out of the evil of sweating; (*b*) the peaceful settlement of labor disputes, in order to prevent strikes and lockouts.

Her isolation, her compactness, her great wealth, her comparatively small population, her miniature industrial enterprises, have made it possible for her to experiment along legislative lines that other countries not so favorably circumstanced would hesitate even to consider.

Whatever mistakes might be made in such legislation could be rectified within a reasonable time without serious loss or great dislocation of any industry. Whatever financial damage might be done was not likely to be serious enough to do lasting injury.

The initial labor legislative steps were taken shortly after the great sympathetic maritime strike of 1890. In this year the trades unions stood well financed. The seamen's union went on a strike sympathetically with the Australian seamen, who struck because of employment of Asiatic crews. The wharf laborers also went out, and were supported by other unions. The coast trade was paralyzed. Public sentiment, however, was against the strike.

The unions were then few in number. Rural workers came in and took the strikers' places. In the end, the unions lost the strike and were impoverished. This led the unionists to believe that the strike is not the best way to secure their ends. It was decided by them that in the future they would resort to the ballot. In consequence, with the aid of labor, the first Liberal administration was brought into power, by the end of 1890.

At that time it was claimed that the farmers were struggling under heavy mortgages. Money lenders were grabbing the land. Interest being from ten to fifteen per cent. The first act of the new Liberal gov-

ernment was to borrow money at three per cent and loan it to the settlers at four and one half per cent. This rate included one per cent for a sinking fund to go toward wiping out in time the principal, which when compounded it was able to do in a period of about thirty-two years.

The new administration also passed a factory act, seeking the welfare of female and child labor. In early days the government sold land for $2.50, and even as low as $2 an acre, resulting in building up a landed aristocracy. The government then passed an act empowering itself to buy back as much of the land as might be required from time to time and dispose of it in small parcels. Later, the single land tax was adopted. The government reserved to itself the right to buy land at the valuation for assessment put upon it by the owner plus ten per cent. Seeing what the government had done for the farmers, the workers asked "What are you going to do for us?" The government responded in various acts.

The result of the maritime 1890 strike led the then Labor Minister Pember B. Reeves, Labor Secretary Edward Tregear and others to see if there was not some other way than strikes to settle labor disputes. If judges can decide matters affecting life and death and millions in property, why not let them decide matters affecting wages? "There is another party to labor disputes," men such as these held, "the great public. There are not two persons involved in a strike, but three," they said. So New Zealand proposed to say, "We are not going to allow you two, employers and men, to disturb and dislocate our affairs." It proposed to say to the parties to the dispute, "Take your industrial troubles before a disinterested tribunal who shall decide between you."

In a document issued by the Labor Department of New Zealand the following appears:

SWEATING.

The New Zealand legislature decreed that all textile work should be done in factories, and that all workrooms employing two or more persons must be registered under the act. It is also forbidden to sweat by permitting (*i. e.*, generally, by exercising indirect compulsion) a factory worker to take home work to finish, and so to toil through unreasonably long hours in probably unhealthy surroundings.

The following is a short list of earnings and hours worked in some of the sweated trades in England shown in the exhibit:

Description of work.	Rates paid.	Average working day.	Average earnings per week.
Bag making	4d. (8c) per dozen.	16 hours.	4s. 0d. (96c)
Matchbox making	2½s. (62c) per gross.	16 hours.	7s. 6d. ($1.80)
Boys' knickers	9d. (18c) per dozen.	16 hours.	9s. 0d. ($2.16)
Fur tassel work	1s. 3d. (31c) per gross.	10 hours.	6s. 0d. ($1.44)
Skirts	5d. (10c) per piece.	14 hours.	5s. 0d. ($1.20)
Button carding	½d. (1c) per gross.	11 hours.	3s. 0d. (72c)

Such earnings, miserable as they are, do not always represent the work of a single person; children of the most tender age are called on to assist the parent to keep body and soul together. Nor are the hours limited to those above mentioned. We read of women who work in such industries from 4 a. m. till midnight, or who never go to bed on the same day that they get up. How is it possible to keep the

home or the person in cleanliness and respectability when every moment of the working day has to be devoted to ceaseless and degrading toil? Moreover, the miserable earnings quoted above by no means represent the amount which can be devoted to the sustenance of life and warmth, in food and clothing. A mother and daughter working together at card hooks and eyes earn 3s. 4d. (80c.) weekly between them, but the rent of their room is 3s. 6d. (84c.). Here other members of the family have to help. An old woman and her brother, sitting fifteen hours daily sewing buttons on cards, earn 3s. 6d. (84c.) weekly between the two; the rent is 3s. 9d. (90c.), but the woman has some church schools to clean, so they drag along. A slipper maker earning 6s. 3d. ($1.50) weekly, pays 2s. 6d. (60c.) rent. So goes on the awful story of human toil and suffering. To call a system which exists on such maker earning 6s. 3d. ($1.50) weekly, pays 2s. 6d. (60c) rent. So goes on the awful story of human toil and suffering. To call a system which exists on such foundations a system of wage-slavery is to use an improper term and to debase the word "slavery," because no slave is worked for eighteen out of twenty-four hours on insufficient food by a master who values his property.

The following is taken from the New Zealand Yearbook for 1908, issued by the government:

Labor Laws, page 515: The labor laws have been passed in an effort to regulate certain conditions affecting employer and employed. Their scope embraces many difficult positions into which the exigencies of modern industrial life have forced those engaged in trades and handicrafts. The general tendency of these laws is to ameliorate the conditions of the worker by preventing social oppression through undue influence, or through unsatisfactory conditions of sanitation. It will undoubtedly be found that, with the advance of time, these laws are capable of improvement and amendment, but they have already done much to make the lives of operatives of fuller and more healthy growth, and their aim is to prevent the installation of abuses before such abuses attain formidable dimensions.

Page 516: Sweating has almost disappeared in New Zealand by the prohibition of subcontracting in the issue of textiles to be made up into garments. The factories act is probably one of the most complete and perfect laws to be found on the statute book of any country, and is generally appreciated by workers, while the honest, fair-dealing employer is himself thereby protected from the unscrupulous proceedings of the piratical competitors.

LABOR LEGISLATION.

New Zealand has now been living under its labor legislation for a period of fifteen years. During this time the law has undergone many modifications and changes and while the underlying principle in the mind of the framer of the original law remains the same, its method of administration and the scope of its usefulness are widely different from the original idea.

The following excerpts from a pamphlet published by the New Zealand Labor Department, give a condensed history of the legislation to date:

Before the advent of the ministry, which has been continuous as the Ballance-Seddon-Ward administration, there was no truck act nor factories act, no shop and office act, no arbitration act, no shearers' accommodation act, no workman's compensation for accidents act. It was a world in which men and women toiled under relentless conditions, each worker making the best bargain with his employer which necessity would permit him to do. Often the hours were long, the overtime unpaid for, the holidays nil, payment made partly in goods (truck), and all the risks of industrial life carried on at the worker's expense in life and limb.

THE INDUSTRIAL CONCILIATION AND ARBITRATION ACT.

Page 4: In 1894 an act to encourage the formation of unions was passed, and named "The Industrial Conciliation and Arbitration Act." It provides that any number of persons, not being less than seven, might form an industrial union of workers or employers, and a number of unions could be registered as an association. The colony was divided into industrial districts, each district having a board of conciliation for the settlement of trade disputes, with appeal to the court of arbitration having jurisdiction over both islands. The board consisted of four, five or six members (generally four), to be chosen as representatives of employers and workers, and these members were to elect some other person as chairman, failing with selection the governor should appoint. The members of the board held office for three years. Strikes or lockouts were declared illegal if taking place while proceedings were pending before board or court. Special boards of experts in a trade could be elected by employers and workmen's unions for each dispute, but this provision was never taken advantage of until quite lately. The board was to endeavor to bring about amicable settlement, and if this took place an agreement could be entered into. Failing settlement a recommendation was made by the board, and if not accepted, any party could refer the matter to the arbitration court. The court of arbitration consisted of three members, two of whom were appointed by the governor, one on the recommendation of industrial associations (not merely unions) of workers in the colony, and the other on a similar recommendation by associations of employers. The third member was to be a judge of the supreme court as president. The court could deal with all industrial disputes referred to it, and make awards, of not exceeding two years' duration, binding on every person declared to be bound. The awards could be enforced in the supreme court, but any award within the jurisdiction of a district or magistrate's court could be taken to such court. There was a corporate limit of £500 ($2,425) for enforcement, and an individual limit of £10 ($48.50). The government railway commissioners were deemed employers, but not any other government department.

In 1895 the number of employers requisite to form a union was reduced from seven to five; two experts (one on each side) were provided, if necessary, to sit with board or court. The governor could appoint a member of a board or court if unions failed to elect, and any employer, association or union could be joined as a party to a dispute by a board or court.

In 1898 the title of the principal act as to its being an act "to encourage the formation of unions" was selected. The court was empowered to determine what constituted a breach of its own award, and the maximum penalty was fixed at £500 ($2,425). The court was not allowed to fix the age for commencement or termination of apprenticeship. The union had to pass a special resolution before it could file a dispute, while the court was permitted to prescribe the minimum wage and provide for underrate permits. By the amending act of 1900 the definition of industry was altered to include "any employment in which a worker is employed." The office of registrar was transferred from the "Registrar of Friendly Societies to the Secretary for Labor." Preference to unionists became included among the industrial matters which could be dealt with. The minimum number of employers necessary to form a union was reduced to two. The registrar could refuse to register two industrial unions of the same business within the same industrial district. Industrial agreements remaining in force until superseded or until the union of workers was canceled, while parties could be added during its currency. The recommendations of the conciliation board became an agreement if no objection was lodged within a month. The two elected members of the arbitration court were to be recommended by unions of employers and workers, not by associations. President and one member to be a quorum of the court. The maximum currency of an award was extended from two years to three, but then continued in force until a new award was made. Beside the original parties to an award, such award bound all persons engaging in the business while the award was in force. Power was given to amend an award and to extend it in cases of one part of the colony unfairly competing against another. Instead of railway commissioners the minister for

railways could enter into the Amalgamated Society of Railway Servants, but in matters of the government railways the conciliation board could not interfere.

In 1901 special boards could be set up by application of any party to a dispute, whereas prior to this date all parties to a dispute must apply for such special board. Court received power to limit the locality of an award within an industrial district or to extend it beyond that district. The registrar was empowered to cancel unions if within a reasonable time no returns from the union were forthcoming. Either party could refer a dispute already filed with the conciliation board direct to the arbitration court. (This section is the famous "Willis Blot," and resulted in the ultimate paralysis of conciliation boards.) The court could make one award applicable to several trades in any one business, *e. g.*, could make for a woolen mill one award covering enginemen, dyers, sorters, weavers, etc.

By the amending act of 1903 a deputy registrar of unions could be appointed. An employer was not entitled to dismiss any worker merely because that worker was entitled to the benefit of an award, or because he was a unionist. Combinations of employers or of unionists to endeavor to defeat an award were forbidden. Inspectors of factories and inspectors of mines became inspectors of awards, and were charged with the duty of seeing the award carried out. The arbitration court emergency act provided substitutes for members of the court in case of illness or other cause of absence, and pending such appointment of substitute the president could recommend the appointment of an acting member.

In 1905 a consolidating act was passed, and is that in force as "the principal act" at date; and also a separate amending act became a law. The latter made provision for binding any worker (unionist or nonunionist) employed by any employer on whom an award was binding. A more stringent section than that of 1903 dealt with dismissing or suspending a worker, or with the worker discontinuing work during the pendency of a dispute. The proceedings with regard to underrate permits were fully set out. Any one who joined a strike or lockout, or aided or abetted a strike or lockout, was made guilty of breach of award. (*Note:* Previously a strike or lockout was only punishable when taking place during the currency of proceedings before a board or court.) A worker was deemed to be dismissed when suspended for a longer period than ten days. In 1906 a short act was passed for the purpose of amending the statutory position of the officer presiding over the arbitration court, providing for his permanent appointment, and substituting the title of "judge" for that of "president." A registrar of the court is also provided for. The remuneration of the elected members of the court is fixed at £500 ($2,425) per annum in addition to traveling expenses.

The arbitration act, difficult to follow in all these amendments, suffered from this cause of absolute necessity of change, as time and experience presented new difficulties to be overcome. It entered its legislative life through an utterly unknown field of action, and with continually changing circumstances marking its industrial path. It is, therefore, little to be wondered at that so experimental and tentative a measure could not be at first guarded at every point, nor adapt itself automatically to meet every subtle evasion of its powers.

DEALING PARTICULARLY WITH THE LABOR LEGISLATION OF THE YEAR 1908.

First and foremost must be noted the changes made in the industrial conciliation and arbitration act, the new measure coming into force on the first day of January, 1909.

Conciliation boards are abolished, and commissioners of conciliation are to be appointed for three years by the government, such commissioners to promptly visit any locality in which an industrial dispute is reported to exist. If a commissioner is unable to settle the dispute satisfactorily, it may be referred to a council of conciliation, of which the commissioner is chairman. This council consists of two, four or six assessors, nominated in equal number by the parties to the dispute. Such assessor must be engaged in the industry to which the dispute relates, with the exception that one on either side may, with the approval of the commissioner, be a person not so engaged. In this council the commissioner has only a casting

vote, and that for the maintenance of business before the council, not for the purpose of making an industrial recommendation.

The council has power to summon witnesses, take evidence on oath, etc., in the endeavor to bring about the settlement of the dispute, but it is not in any sense a tribunal, or with any inherent powers of settlement. If the council agree on certain line of action the matter is submitted to the principals on either side (employers or workers' union), and ratified by these principals, an industrial agreement is filed with the clerk of awards, whereupon the matter is at an end.

Should the council fail to come to an agreement, it shall, not earlier than one month or later than two months after the date fixed for hearing the dispute, notify the clerk of awards. It may, however, make a recommendation, if the assessors are unanimous in coming to such a conclusion, before forwarding the notification, but the recommendation itself has no power to bind or restrict in any way, and may be considered as only of value in minor directions, viz., as a guide to public opinion in the matter and a suggestion towards settlement. The dispute, failing its settlement by the council, goes automatically to the arbitration court.

It will at once be perceived how different the above procedure is from that formerly regulating the proceedings of conciliation boards. The members of those boards were appointed for three years, and all varieties of trade disputes came before them. Each representative of employer or worker on the board was expert only in his own trade, and practically ignorant of the technicalities of all others. Consequently, the facts of any dispute could only be elicited by the profuse evidence of witnesses, and through such evidence by the temporary education of the board in that particular industry. The delay, the expense, and the militant spirit invoked by the public examination and cross-examination of witnesses destroyed any tendency to conciliation that the boards may have at first possessed. They grew into almost universal discredit, so that it became easy to supersede them by the amendment (moved in the house of representatives by a private member), which allowed either party to a dispute to take it direct to the arbitration court. It was publicly said to be useless to have a case heard twice, once before the board and then before the court, when the court could be applied to directly. The result, however, was to congest the arbitration court with business; to delay its findings, whether in regard to disputes or to breaches of awards. There would have been little dissatisfaction expressed for years against the arbitration court could the serious delays and inconveniences arising from its overwork have never occurred. Had the boards fulfilled the promise with which they were instituted, had it been possible for them to be kept as a pure medium for amicable arrangements between disputants, then the channels of the court would not have become clogged and choked with demands for arbitrary judgments.

The new act provides full definition of "strike" and "lockout." These are interpreted to be the action of discontinuing work or business as modes of industrial compulsion, so that they have no continuous existence as offenses, although they are continuous in respect to aiding and abetting. Imprisonment for striking or for abetting a strike is abolished entirely for ordinary strikes, and the penalty for each worker who takes part in one not exceeding £10 ($48.50). A similar penalty falls on a worker who aids or instigates a strike. Every union that instigates or aids a strike is liable to a penalty not exceeding £500 ($2,425). The terms "strike" and "lockout" are herewith made conditional so as to mean only strikes or lockouts occurring in industries bound by an award or industrial agreement. A more stringent provision is made in regard to certain special industries whose sudden cession would cause deaths or injury to the health of the community in general. These include the manufacture or supply of electricity, coal gas, water, milk, meat, coal, and the working of ferries, tramways, railways, etc. Persons employed in such service must give fourteen days' notice of intention to strike, or are liable to summary conviction before a magistrate with a fine not exceeding £25 ($121.25). Persons who aid or instigate strikes in such trade are liable to a similar fine, and in the case of unions up to £500 ($2,425). An employer locking out in such special trade without giving a month's notice to his employees is liable to summary conviction before a magistrate

and a fine not exceeding £500 ($2,425), a fine which is also liable to be inflicted on any union, employer, or person other than a worker aiding or abetting a lockout. An industrial union or association abetting an unlawful strike of any of its members may on conviction have its certificate of registration suspended for a period not exceeding two years. The court has power to limit the area of this suspension, but during the time of suspension no new industrial union of workers may be registered in the same industry in the same industrial district.

Such definite and decisive enactments as these lay down certain principles as absolutely necessary for the further usefulness of the act. There was in the act in its first introduction in 1894 no bar against strikes or lockouts unless these took place while inquiry before the board or court was pending, and this was not altered until the act of 1905 made a strike or lockout a breach of award. The whole subject had hitherto been in a hazy or nebulous condition; no one exactly knew what a strike was, when it began or when it ended; neither was there any consensus of opinion as to what "aiding or abetting" a strike meant. We have in the new act at all events a determined effort to clear the ground, and set the issues fairly, not only before the employer and employed, but before the general public, who, as "the great third party," generally has to pay the reckoning for both sides in industrial quarrels.

Ordinary breaches of award are to be heard before stipendary magistrates. A magistrate may give judgment for the amount claimed or for more or less, as he thinks fit; such amount becoming a penalty paid to the use of the crown. An appeal is allowed to the court of arbitration. No person can be imprisoned for breach of award, but any penalty imposed may be recovered by deduction from wages which may hereafter become due, although not to a greater amount than the surplus above two pounds ($9.70) a week, if the debtor is married, or a widower or widow with children, nor to a greater amount than the surplus above one pound ($4.85) a week in the case of any other worker. If judgment has been given against a union or other association and is not satisfied within a month the individual workers are liable to the extent of £5 ($4.85) each. Inspectors of awards can move a strike or lockout case (although a breach of award) directly to the arbitration court, as such grave matters (with, perhaps, heavy fines) need the responsibility of the highest court obtainable.

As has been above remarked, the present act has suffered through want of mobility, and through being overburdened with duties caused by the collapse of other portions of the act. Removing the hearing of ordinary breaches of award into the stipendary magistrate's court will set the arbitration court more free to hear cases of industrial dispute at once.

Three employers (formerly two) may form an industrial union of employers and fifteen workmen (formerly seven) may form an industrial union of workers. The voting power of unions in nominating members of the arbitration court is altered from one vote to each union, to one vote for each fifty members of a union. The court may amend the provisions of any award in the flax industry if it is thought advisable, and if circumstances have changed since the award was made, but the general power to change any other award on application does not exist. In the flax industry the court must satisfy itself that the wish for change is general both among employers and employed before it grants any amendment. Any executive officer of a workers' union, or worker who has sat as assessor in a council of conciliation, or has represented his union in any negotiations, can, if dismissed soon after, throw upon the employer dismissing him the weight of proof necessary to show that his dismissal has been for business reasons only, and not through any objection to him as a unionist or assessor.

A worker who has accepted less than the minimum wage awarded in the industry can not claim the difference between the rate received and the award rate for a longer period than three months. The age limit of apprentice is to be left to the discretion of the court in making an award. Inspectors of awards are the persons to issue permits to work below the minimum rate mentioned in an award, but must give notice as at present to the secretary of that particular workers' union, so that objection may be made if necessary to the permit being granted. No such permit

shall be given to any one not usually employed in that industry, *e. g.*, no sailor out of work can do carpentry or painting of a trade character.

One of the most important sections of the new act is that which restricts the definition of the word "worker" to those employed for the direct or indirect pecuniary gain of the employer. Thus, a market gardener is a worker, but a private gardener is a servant; the housemaid in a lodging-house or hotel is a worker, but a domestic servant in a private house is not.

The court may antedate the period at which its award comes into force, and it may also refuse to make an award at all if it thinks fit. This latter provision gives legislative sanction to a course the arbitration court has already followed in one or two cases. Jurisdiction is given to the court to extend an industrial agreement to bind a dissenting body of employers if the employer or employers who employ a majority of the industry consent to such agreement. After an award or industrial agreement is made its provisions will take precedence of any legislation made during its currency unless the contrary is directly stated in the act so passed: but at the expiration of the time for which the award or agreement was made the provisions of the law then in force must be observed.

A very large proportion of the account thus given of the new act refers to absolutely new and original modes of legislation in the direction of conciliation and arbitration. They prove the strong attempt of the government to reconcile the liberty of the individual with the discipline necessary to carry on the industrial and commercial life of the community, for to those who do not care to place themselves under the arbitration act the utmost freedom is given, whether to work or strike, but, if the benefits of arbitration are appealed for, then submission to the ordinary rules of conduct governing those who have claimed its privileges must control also those who feel its disadvantages.

The following clause was recently introduced by the arbitration court of New Zealand into its award in the Southland timber workers' dispute:

(*a*). The union shall do all in its power to prevent any strike by any of the workers affected by the award, and if any strike shall occur, in which any member of the union shall take part, such strike shall be prima facie evidence that the union has committed a breach of its duty thereunder.

(*b*). If any strike by any of the workers affected by this award shall occur, then the operation of all the provisions contained in the foregoing clauses of this award shall be suspended, and in lieu thereof the following provisions shall come into force, and shall remain in force until the further order of the court; that is to say, the hours of work, wages, and other conditions of work of all workers coming within the scope of this award shall be fixed by agreement between each employer and the individual workers employed by him.

(*c*). The court reserved leave to any party bound by this award to apply to this court for an order under this clause declaring that a strike has taken place, or bring into force again, after a strike has taken place, the provisions contained in the foregoing clauses of this award.

Then follows this very important memorandum of the court:

This award contains a new provision with regard to strikes which the court has decided to bring into general operation in future. It is necessary to explain the operation of this new provision. If a strike by any of the workers affected by the

award takes place, the provisions of the award as to the hours, wages, and other conditions will cease at once to operate, and thenceforth during the currency of the award the respective rights of the employers and workers as to these matters will have to be settled by agreements between the respective parties themselves. In other words the workers by striking will deprive themselves of the benefits (if any) of the award, and incidentally of the benefits of the arbitration act. They will, however, during the currency of the award remain subject to the penal provisions of the act with regard to strikes. These provisions will make it impossible for an award to be treated as a stepping-stone merely in the way of enforcing the demands of the workers. If, after getting an award, they strike, and the strike fails, they will not be able to fall back on the award, but will have to be content with whatever terms they can obtain by individual bargaining with the employers. The court has reserved power to itself to bring into operation again the provisions of the award after a strike has taken place. This will enable the court to obviate the hardship that might otherwise result when a small section of the workers affected by the award engage in a strike without the sanction or connivance of the union.

ATTITUDE OF EMPLOYERS AND WORKERS TO LABOR LEGISLATION.

Prior to the adoption of the amendments to the act of 1908, which went into effect January 1st of this year, there was very bitter dissatisfaction on the part of employers and men with its operations. The sentiments expressed and the resolutions passed alike at labor conferences and at conferences of employers were unmistakably against the administration of the act. Here are some of the opinions expressed emphasizing this point.

A labor department official—

Fifteen years' experience has shown this weakness in the system. Men are governed by greed, hate, love, and passion and not by reason. The act has failed because reason does not prevail. Labor elected as conciliator in Wellington an unsteady hothead. The other side was just as badly represented. Out of twenty-four cases twenty were appealed to the arbitration court leading to dissatisfaction because of the useless work of the conciliation board and the board was finally cut out, which led to further congestion of the court and yet more greatly emphasized the consequent delays. The workers expected too much of the idea, especially since during the first ten years it did much for them in shortening hours, raising wages, paying for holidays and often the law gave preferences to unionists. But it could not move the whole economic and individual interests.

A leading editor—

No doubt compulsory arbitration has done much for New Zealand. The trouble has been in its administration.

Labor leader—

We want the act. But we want it as originally conceived by the framer, with, of course, such machinery amendments as experience has shown are essential.

A building contractor—

The weakness of the act has not been so much its principle as its administration.

Sentiments of a labor leader at a labor conference—

The workers had been making complaints about the act and had been endeavoring by every legitimate means to impress upon the government the necessity of improvement in the machinery of the act. One chief grievance was in the delay that occurred in the hearing of the disputes. Year after they had been promised that

this should be remedied, but no remedy was provided. It was entirely because of the delays of the court that the slaughtermen had taken the drastic steps they had in striking for their rights, and if their action resulted in an improved act, it would prove a blessing to the country.

He thought himself that the strike instead of doing what it was alleged it would do, that was, break down the conciliation and arbitration act (if the lesson was to be taught by a strike) instead of the strike meaning and causing the breakdown of the act, it was going to be the saving of it. The legislature would then recognize—and he hoped it would—that the position that had existed for the past eight or nine years was totally unreasonable, and it was a position of affairs that could expect no reasonable body of individuals to accept. He knew of cases where unions had been brought into existence, had been registered, had framed their claims, had cited their case, and were dead and buried long before the court had come along to hear their case. * * * It was totally unreasonable to expect men to wait from ten months to two years for the court to consider their cases.

ATTITUDE OF EMPLOYERS AND MEN ON LABOR LEGISLATION IN GENERAL.

The amendments to the act enacted in 1908, and that have now been in force since the beginning of this year, have tended to modify the hostility toward the act. Many employers and men felt that the government was earnestly desiring to make the act one of the highest usefulness with the least friction, injury, or annoyance to either side, and numbers on both sides have accordingly shown a readiness and a willingness to give it hearty support and a fair trial. The utterances of President Hobbs at the conference of employers held in Christchurch in 1908 I think fairly represent the attitude of many New Zealand employers. He said:

Now that the act is before the house for amendment or repeal it is advisable for us as employers to consider whether or not we want compulsory arbitration. The advantages of the system if it can be equally enforced are—

For the worker:

Prevention of sweating;
The securing of a fair return for his labor.

For the employer:

Security of contract;
Settled working conditions for a stated time;
Equality of working conditions;
Security to the fair-minded employers, by prevention of undercutting of prices at the workers' expense.

Any act that will secure these conditions must be beneficial to both worker and employer, and should receive our support. In considering this question we have also to remember that even if no act dealing with industrial disputes is on the statute book, we shall not have freedom of action, because the other side is now a powerful force, well organized, and able to use the strike weapon as it never has before. Open industrial warfare brings heavy losses to both winner and loser. I have for some time opposed compulsory arbitration and in favor of a measure promoting voluntary conciliation, because it did not seem possible to amend the law so as to make compulsion effective against both sides. Equality before the law is a fundamental principle of British justice. It is a precious heritage which we can no longer allow to be traduced. The government has fairly faced the position, and brought down a method of enforcement which seems to have some claims of successful operation. It might well be called "The last try compulsory arbitration bill," and as employers I think it would be in the best interests, both of ourselves and of

the community as a whole, if we give this last try a fair trial. If it fails, the matter will be definitely settled. On the other hand, if this method is not tried there will always be a feeling that the failure of compulsory arbitration has not been proved, and, at some future time there is no doubt that an act on the lines of that now proposed would become law, and the whole trouble begun over again.

The attitude of many among the workers whom I interviewed was likewise to the effect that the recent amendments would largely if not entirely overcome some of the most serious objections to the administration of the act, that the new machinery provided would expedite cases, and obviate the distressing delays previously incurred by the men in their desire to obtain peaceful redress for grievances.

This does not mean, however, that there is a unanimity of feeling in favor of labor legislation among employers and workers in New Zealand. The feeling more especially among many employers, is that such legislation has on the whole been harmful to industry and has in many ways brought with it evils not before experienced. Here are some of the opinions expressed by employers and secretaries of employers' associations in various parts of the dominion.

A leading business man—

The theory of compulsory arbitration is good, but it often miscarries and becomes reduced to an absurdity. I regard it as a failure and feel morally certain that in time it will be abandoned.

Another business man—

The act leads to friction and ill will between employer and men.

An ironmaster—

The iron industry under the workings of the act is not profitable. The arbitration court is part of a political machine gotten up for the benefit of the workers. To illustrate this, let me say that in the face of a bad showing as to profits, the court raised the wages of the men ten per cent. Moreover, the tendency of the law is to make for a lessened efficiency on the part of the men.

A manager of meat packing company—

It makes of the men mere machines.

A secretary of an employers' association—

In some trades employers have not been able to cope with the extra cost of production due to the increased wages granted by the court, and hence have been obliged to give up the manufacturing part of their business and increase their importations.

The minimum wage is fixed too high in the majority of cases with the result that the employer often makes no distinction among the various grades of his workmen as regards rate of pay. This tends to reduce efficiency and takes away from the capable man any ambition he may have. The relation between employers and their men have been less cordial than they were previous to the operation of the act. In the majority of cases both sides occupy hostile camps. Some employers are harassed by what may be called "vexatious legislation."

Hardly any new industry has been started for some years and this notwithstanding that the conditions of the dominion have been eminently favorable for industrial enterprises. It is an undisputed fact that people having money to invest have carefully avoided any concern in which labor is the chief item of expenditure.

A master baker—

Compulsory arbitration is a lot of rot. It did not prevent the journeymen bakers here in Wellington from going on a strike.

An ironmaster—

Our increased imports are due to the labor laws. The act leads to a diminishing output and makes for a dead level.

A college professor—

Reduction in wages in hard times, even when prices come down, will cause enough strikes to smash the system.

A mine owner—

What is to become of our industries in bad times when we have to pay a wage fixed by the court higher than the industry can stand?

A secretary of an employers' association—

The result on trade of thirteen years' working of the act is that it has not been advantageous. In many trades it has opened the door to importations, owing to the increased cost of production, preventing the local industries from competing with the open market. It is not advantageous to the community owing to the increased cost of living, both in rents and commodities, resulting from its operations.

Speaking generally, therefore, the New Zealand Employers' Federation does not think the industrial conciliation and arbitration act has proved beneficial to worker, employer or consumer.

A manufacturer of tinware—

It makes the men too damned independent. There are many annoyances to the employer connected with the act. It can not prevent strikes. Although employers do not try to evade awards, it needs a lawyer not to miss some of the provisions and avoid getting into the clutches of the court.

A building contractor—

Believe it would be better if labor laws and labor unions were abolished. The act is responsible for higher cost of living and for higher wages.

A secretary of contractors' association—

We were to sacrifice freedom for industrial peace under the act. Now we find we have sacrificed both.

A clothing manufacturer—

The chief objection I see to the act is the annoyance likely to come from the government inspectors.

A manager of a meat works—

The chief objections to the act are the hours established, the preference to unionists, and the petty annoyances to which employers are subjected.

A master plumber—

The preference to unionists clause is a thorn in the side of employers.

A secretary of an employers' association—

Employers consider the act a hindrance because,

(*a*) It makes for the dead level among workers.
(*b*) It limits apprentices.
(*c*) It checks industrial expansion.
(*d*) It destroys friendly relations between employers and men.
(*e*) It has raised the cost of living.
(*f*) It has abnormally raised wages.

An ironmaster—

Feels that employers' candle is burning at both ends. Higher wages and lower efficiency prevails because of the act. The greatest grievance is that most of the disputes are artificial and manufactured.

An ironmaster—

Instead of being a court of reference in case of dispute or misunderstanding likely to result from a strike or lockout, to the detriment or loss of a community, the court of arbitration has become, under the pressure of unionist importunity, a court for the state regulation of industries.

A leading employer—

The court has been used not as a preventive or cure, but as a convenient substitute for strikes, as an instrument for giving form and substance to ambitions, which, in its absence, would probably not have developed into disagreements, and almost certainly would never have culminated into serious disputes. The result is that at the first real trial the system has, judged by its original intention, broken down. The court can punish a man for striking, but it can not persuade him to work on terms which are distasteful to him. On the other hand, it may punish an employer for locking out his men, but it can not make him reopen and run his factory at a loss.

A lawyer—

If there is a lesson to be learned by other countries from the experience of New Zealand, it is this: That, if they want a system of arbitration for the settlement of strikes and real disputes rather than one for the creation and multiplication of factitious disputes, they should adopt some such system as that of Massachusetts. It has been said that labor passes through three stages—when it is enslaved, when it is free, and when it is tyrannical. In New Zealand it has reached the third stage.

A secretary of an employers' association—

To my mind there are five unmistakable defects which have largely contributed to the failure of the act to bring about the desired results:

(1) The act has been jeopardized by its going beyond wages and hours of work.

(2) In making it far too easy for the unions to bring cases before the court.

(3) The fixing of a standard instead of a minimum wage.

(4) The holding of individual workers and unions, in place of unions only, responsible for strikes.

(5) The too frequent changes of the judges.

* * * (The act) has been a real hindrance in that it has greatly increased the cost of production. The history of the colony during the past few years has been increased importation and an almost stationary local output.

It (the act) has created strife, manufactured disputes, impaired the work, restricted the output, increased the cost of production, put up the cost of living to such an extent that a pound to-day goes no further than did sixteen shillings in 1894. * * * The latest statistics show the increase in wages to be from eight and one half per cent to ten per cent, the increased cost of living from twenty-five to thirty per cent.

A secretary of an employers' association—

If the industries of the country are to progress as they ought to they must not be hampered by labor legislation. I am of the opinion, after a careful study of the labor matters here for nine years, that the arbitration act has hindered, and is still hindering, the industrial progress of the country.

EMPLOYERS AND OTHERS WHO FAVOR THE ACT.

It must not be presumed from the foregoing unfavorable and more or less hostile opinions on the part of employers and others toward the act that it has no friends. Here are the opinions of some who speak well of it and their reasons why they do:

A building contractor—

The act has weeded out sweating employers. So far as the building trades are concerned it has not affected its progress one way or the other.

A manager of a teaming company—

It has helped the dominion because the act has made for a high degree of industrial peace.

A clothing manufacturer—

It has made no difference in the clothing trade beyond driving out the sweater and in doing this it has rendered very valuable service. Last year a manufacturer was caught sweating and was driven out of the trade through the operations of the law. Had it not been for the law, in all probability, he would by his sweating methods and at the expense of labor have driven fair employers out of the trade.

A shoe manufacturer—

The law makes for steadiness of wages. I could not have fulfilled my government contracts for the Boer war, for example, if it had not been for the awards fixing a wage for a fixed period.

Another shoe manufacturer—

The act has been a great advantage in making for industrial peace.

A publisher—

Finds the act advantageous in his business. It has in his opinion been of great advantage to the dominion. It has cut out sweating, raised the conditions surrounding the worker and has cut out payment exacted by employers for teaching apprentices their trade.

Director in street railway company—

Blames agitators for troubled labor conditions. On the whole, labor situation better than in England. Considers the whole system under the legislation much better than strikes.

A waterside worker—

The hours of labor have been shortened under the act, half holidays have been obtained, sweating has been minimized, and the lot of the men has been generally improved, owing to the industrial legislation.

A labor member of Parliament—

Two thirds of the men are in favor of the act. The attitude of labor generally is that the new amendments should have a fair trial.

A public official—

A few agitators try to make themselves prominent by railing at the act but they would abuse any measure that had become law. They are "agin" the government always. The steady, silent vast majority of labor favors the act.

A contractor's foreman—

Under the old conditions men could be sweated; under the act men can not be sweated. It has had a tendency to level down the good worker to the poorer worker. Despite this the general efficiency of the worker is not lower than before because sweating in itself tended to diminish efficiency.

The president of a labor union—

If the act were put to a referendum of workers, ninety per cent would vote for its retention. It has given them fourteen years of comparative industrial peace at fair wages and under good conditions. When, in their minds, they compare all this with the conditions that prevail in countries where strikes are resorted to, and realize the great amount of loss and suffering that strikes inflict on labor and its dependents, they more keenly appreciate the blessings they enjoy under a system which enables them to have all their grievances settled peaceably.

An ironmaster—

The value of the law is that it prevents sweating.

A wholesale dry goods merchant—

Much prefer the act to strikes.

Manager of steamship company—

Is a strong believer in the value of the act if it is not abused.

Lumber merchant—

Would not be in favor of repealing any part of the act.

A sawmill owner—

Labor legislation of some sort is in his opinion absolutely necessary. The act prevents sweating and is advantageous to fair employers.

Shoe manufacturer—

The relations between employer and employee have improved under the act. There is not the continual temptation for the employer to cut down wages in order to undersell his competitor.

Sentiments uttered at an employers' conference—

In some respects the act is admirable. It gives a measure of assurance of settled conditions, and though this is finally dependent upon the loyalty and consent of both parties, it is no small gain. In so far as it has been effective in preserving industrial peace, as well as securing justice to the disputants, the act may be said to have justified its existence.

Dr. Findlay, attorney general of New Zealand—

The act has been educative of public sentiment. New Zealand has impressed obligations on both sides. The great body of workers are impressed with loyalty to the court.

Ex-Labor member of Parliament—

The act cuts out the sweater, makes for steadiness of wage, and tends to establishing industrial peace. The result of the recently inflicted penalties on strikers has made a repetition of strikes highly improbable.

An architect—

The act is advantageous to employers and to the men. Believe that on the whole both favor it.

Factory inspector—

I find that the majority of employers and their men prefer the act rather than strikes.

Mine manager—

Believes that the majority of the men favor the act.

President of a labor council—

Hard times will show the men the value of the act, by protecting them from cuts in wages likely to follow an open labor market.

WAGES.

In common with the conditions prevailing in the rest of the industrial world wages in recent years have advanced in New Zealand. The rate of advance, however, has not been uniform. The greater advances have taken place in what has been known as the sweated industries, chiefly the textile industries. Secretary Tregear of the Labor Department was good enough to furnish me with a copy of data prepared by his department for the attorney general, which I herewith append, and which will show the change in wages and conditions in these particular industries since the introduction of the act. I am of the opinion that in these branches wages through the operations of the act have increased more than they would have increased if left to the operation of the law of supply and demand, due to the fact that the workers are chiefly unorganized women and children.

DEPARTMENT OF LABOR, WELLINGTON, May 19, 1908.

Memorandum for The Honorable, the Attorney General:

I have the honor to submit herewith a statement in regard to the rates of wages paid in 1890 and those paid to-day to various classes of workers. The information in regard to the early period is taken from the report of the Sweating Commission which sat throughout New Zealand in 1890. From the evidence I have compiled the following statement:

Trade.	1890 (per week).	1908 (per week).
Tailoresses	0s. to 15s. ($3.60).	5s. ($1.20) to 25s. ($6.00)
Hosiery workers	5s. ($1.20) to 9s. ($2.16).	7s. ($1.68) to 20s. ($4.84)
Shirt making	0s. to 18s. 6d. ($4.44).	12s. ($2.88) to 30s. ($7.20)
Average wage	10s. ($2.40) to 12s. ($2.88).	
Dressmaking	0s. to 25s. ($6.00).	5s. ($1.20) to 30s. ($7.20)
Millinery	Average wage 12s. 6d. ($3.00).	5s. ($1.20) to 25s. ($6.00)

The commission found that work used to be taken home by workers who wished to make a few extra shillings. This, as you know, has now been stopped; all work having to be done on the employer's own premises.

Apprentices used to be taken on at the above trades at nothing for a year, and then either given 2s. 6d. (60c.) per week or dismissed. Now no apprentice can be taken on unless they are paid not less than 5s. ($1.20) per week, with an annual increase of 3s. (72c.) per week up to the age of twenty. Should an apprentice wish to go to another employer the time served with the previous employer must count in computing the wage.

Formerly employees' hours were not restricted in any way; now the hours are regulated, and only a limited amount of overtime is allowed in a year, and this extra work must be paid for at special rates.

Employers were able to make their employees work in any sort of room, with or without any kind of convenience. Now they must provide well lighted and ventilated rooms, ample air space, special dining-room, and proper sanitary accommodation.

In 1890 a boy or girl of twelve could be employed in a factory. The age has been raised to fourteen, and no boy or girl under sixteen can be employed in any factory without having passed the fourth standard of education, and, further, without a certificate of fitness from the inspector.

Holidays on full pay were not provided; now a certain number of days are set aside.

The following further information gleaned from the sweating commission's report may be of interest: Boot machinists, sewing uppers, were paid from 12s. ($2.82) to 25s. ($6.00) per week. These workers' rates are now fixed by an award of the arbitration court, and they receive a minimum of 25s. ($6.00) per week.

Young women milliners were made on Saturdays to serve as shop assistants until nearly midnight.

Hairdressers worked from 8 a. m. to 9.30 p. m., and on Saturdays till midnight.

Women assistants in fancy goods and book shops worked from 9 a. m. till 6 one night and 9 the next, and received from 10s. ($2.40) to 30s. ($7.20) per week. (Braithwaite, bookseller, Dunedin (545), said he had five men, two boys and eight women, and admitted he had no lavatories.)

Drapers' assistants were not allowed to sit down. The present act provides for sitting accommodation for all assistants. In the dressmaking trade the hours were from 9 a. m. to 6 p. m., including Saturdays. Apprentices were paid nothing to 9s. ($2.16) per week, and adult women from 10s. ($2.40) to 15s. ($3.60). Only best hands received 25s. ($6.00). Now head dressmakers receive from £2 ($9.60) to £8 ($38.40) per week, while young women in charge of rooms average about £2 10s. ($12.00) per week. Very few adult workers receive less than 30s. ($7.20) per week.

In confectioners' shops women assistants worked from 8 a. m. to 10 p. m. always, and up to 11.30 p. m. on Saturdays, and received from 10s. ($2.40) to 14s. ($3.36) per week.

Boys engaged in milking began work at 3.30 a. m. and after milking delivered the milk in the city. They either went to school or work until the afternoon, and were engaged again at milking and work until 7 p. m.

Dr. Martin found the girls in factories were suffering from anemia through bad ventilation, and also from varicose veins. Dr. Lamb made a similar statement, stating that it was due to the bad ventilation and vitiated air in factories. Girls were found to be working heavy sewing machines with their feet hour after hour, and he considered this very injurious to their health. Dr. Stenhouse also reported that anemia was very common, and in Dunedin its frequency was something extraordinary.

I attach a copy of the sweated commission's report for your information. The number quoted in the margin refers to the number of question in the commission's report.

ED. TREGEAR, Secretary for Labor.

In a pamphlet published by the New Zealand Labor Department in 1907, in connection with an exhibit made at a dominion exposition, the following in relation to wages appears:

	Wages in the United States per hour.	Hours in the United States per week.	Wages in in New Zealand per hour.	Hours in New Zealand.
Blacksmiths	30c	55	34c	46
Boilermakers	28c	55	30c	48
Carpenters	34c	48	32c	45
Plumbers	44c	48	32c	46
Painters	34c	48	30c	45
Laborers	9c	55	24c	50
Bricklayers	54c	46	38c	45
Builders' laborers	28c	48	26c	45

The foregoing figures show that the average weekly earnings in these eight industries in the United States is $16.50 and in New Zealand $14.17.

The American worker earns sixteen per cent more, but works about nine per cent longer hours. For the same number of hours the average American earnings is a fraction over six per cent greater. The average New Zealand weekly wage for the unskilled worker from figures furnished by the labor department is 48s. ($11.52) and for skilled labor 60s. ($14.40) per week. According to a statement attributed to Attorney General Findlay, the average wage for all labor, male and female in New Zealand, is $8.64 per week.

The New Zealand Yearbook for 1908 furnishes the following figures:

	Average annual wage per worker.	Average annual production per worker.	Average labor cost on production.
1900	£69 6s. ($337.09)	£364 ($1,766)	18.55 per cent.
1905	£65 16s. ($310.09)	£346 ($1,675)	19.04 per cent.

The past several years up to 1908 have been phenomenally prosperous for all agricultural and pastoral New Zealand producers. In consequence, farm wages during that period owing to scarcity of labor has advanced far more than wages in other industries. This is shown by the figures found in the New Zealand Yearbooks for 1895 and 1907, pages 164 and 505, respectively. The average increase in wages in *industrial* undertakings working under awards from 1894 to 1906 was 19.7 per cent. The wage increase to workers in *agricultural* and *pastoral* pursuits for the corresponding period is 29.3 per cent. This looks abnormal until we remember that in Italy within the past few years, due partly to scarcity of farm laborers as the result of immigration and partly to the increased cost of farm products and living, the wages of farm labor has advanced from thirteen cents a day to sixty-five cents a day, or about five hundred per cent.

The wonder is not that wages in New Zealand have advanced in recent years. When the advance in wages the world over is considered and the increased demand for all sorts of labor in New Zealand during the prosperous years, in industry, in agriculture and in great New Zealand public works absorbing many thousands of workers is borne in mind, the wonder is that the advance in wages has not been greater.

COST OF LIVING.

Three causes have contributed to an increased cost of living in New Zealand as elsewhere in the world—

(*a*) Higher land values, especially in city lots;

(*b*) The world increase in the price of staples;

(*c*) Higher wages.

The increased wage cost to my mind has been the smallest contributing factor. As shown by the foregoing figures, the labor cost in New Zealand production is less than twenty per cent of the gross cost.

Assuming that wages have advanced twenty per cent this would add but four per cent to the gross cost, whereas rents and the price of world staples have increased out of all proportion to the advance in wages. I was informed by reliable authorities that city lots in the leading New Zealand cities had increased in value in the last ten years fully two hundred per cent, thus very greatly increasing rents.

The most available figures on the relative increase in New Zealand wages and cost of living are to be found in an address delivered by Attorney General Findlay in 1908 in which he says: "At Wanganui I quoted a report from the registrar general, which showed that in twelve years since the act passed the cost of living for workers based on the chief articles of diet had increased 18.6 per cent while the general increase of wages affected by the act in the same period was 17.9 per cent. This report did not include rent or clothing, and it is admitted that if these items had been included the increase in the cost of living would have been greater. Probably the increase has not been less throughout New Zealand than twenty per cent."

RELATIONS EXISTING BETWEEN EMPLOYERS AND THEIR MEN.

There is a pronounced conflict of opinion as to the effect the act has had upon the relations existing between employers and their men. Here are some of the opinions expressed pro and con:

Justice Chapman, formerly president of the arbitration court—

The labor laws, in my opinion, do not create ill-feeling between employers and their men.

A timberman—

The feeling between employers and men is better now than ever before.

Labor leader in seamen's union—

The labor laws have made for a better feeling between employers and their men.

Labor member of Parliament—

The feeling between employers and their men is much the same as before the creation of the act.

The report of the executive committee of the trades and labor council, 1907—

Taken as a whole our relationship with our employers has been of an amicable nature. One of the exceptions may be cited as the recent slaughtermen's strike. While we may sympathize with the men in their efforts to secure increased pay and better conditions, your executive committee can not help expressing its regret at their hasty and ill-advised action in ignoring the remedy provided by the industrial conciliation and arbitration act. We are satisfied, however, that this cloud that at one time threatened to spread over the whole industrial horizon of the colony has been dispersed and that the men by their ready compliance with the verdict of the court are showing that the powers of the court are as potent to-day as ever they were.

As against these favorable opinions there are others radically opposite, which herewith follow:

Mr. George T. Booth of Christchurch, an ironmaster, in his testimony before the legislative committee—

Q. What is your experience with regard to the effect of our labor laws? Have they promoted a good feeling between employer and employee during the time they have been in operation?

A. I believe they have had the reverse effect.

Q. But do you not think that the relations between employer and employee have been improved by the labor legislation?

A. No, I think it has had the opposite effect.

Secretary of builders' association—

Employers in the building trades say that a serious result of the act is to destroy any prior existing sympathetic bond between them and their men and that the gap is widening.

A master cabinetmaker—

The labor laws lead to antagonisms between employers and their men.

Mr. Tregear, the labor secretary, in this connection said that, "in spite of assertions made by extremists on both sides, the relation between employers and men are as good as they can ever be under the wage system." He pointed out that there was friction about a year ago, but that the alteration in the arbitration act last session of Parliament had smoothed away the trouble.

This is a point upon which it is not possible to do more than to get opinions. My own opinion is that there is less friction and a more cordial feeling on the whole here between employers and employed than I have found in countries where strikes and lockouts prevail.

LABOR UNIONISM.

The New Zealand Yearbook for 1908 gives the number of industrial workers under date of April, 1906, as 56,359. The same authority, page 519, gives the membership of workers' unions, not including nine who failed to send in their returns, as 45,614. In 1895, when the act went into operation, there were 9,370 union members. In most countries in Europe the number of organized workers will not average twenty-five per cent of the entire body of wage-earners. Owing to the fact that the Yearbook quoted gives the number employed industrially as under date of April, 1906, and the number of union workers as under date of December, 1907, it is not possible to get at the exact proportion of union workers. Approximately it is safe to assume that the union workers represent seventy-five per cent of the whole, which is far ahead of the proportion to be found in Europe or America. It would indicate that the act has certainly made for unionism.

A Labor member of Parliament, in speaking of the influence of the act

on unionism, says: "The well organized unions are not so active as they were before the act was passed, but there are more large unions."

A government labor department official in this connection says: "Some say that the unions have lost their 'fighting spirit.' I do not know if that is a serious loss. It is not necessary to swagger round with a belt full of revolvers if the policeman does his work properly. Our law is the policeman, and so perhaps the unions get 'soft'—get like you and me compared with a cowboy of the 'wild and woolly west.' If by 'well off' you mean 'financially,' when the arbitration act passed, the unions had nothing at all; they were broken, flaccid, and penniless after the great maritime strike in 1891. Now some of them have £800 or £1,000 each—no great sum, but then they are only 'industrial unions'; they have no trade union purposes—the act fights for them, so, except to pay a secretary, expenses are nil, and the funds grow."

As was stated by one of my informants, the preference to unionists' clause in most of the awards of the arbitration court is a thorn in the side of most employers. Under the law an employer needing a hand must first of all refer to the register kept by the union secretary, and if there are applicants on the list he must give such a preference over non-unionists, subject in the event of failing to do this to being penalized by the court. This is looked upon by employers generally as a source of annoyance and a hardship. The workers, however, claim that since the law takes from them the legal right to strike, they are entitled to some consideration in return. The following copy of a preference clause as it appears in the award made by the arbitration court for the Wellington wharf laborers indicates the attitude of the court on this vexed point.

(Award of the arbitration court for Wellington wharf laborers. Extracts, pp. 6-7-8.)

Preference.—If and so long as the rules of the union shall permit any person of good character to become a member of the union upon payment of an entrance fee not exceeding 2s. 6d. (60c), and of subsequent contributions not exceeding 6d. (12c.) per week, upon a written application of the person wishing to join the union, without ballot or other election, then and in such case and thereafter the employers shall employ members of the union in preference to nonmembers, provided there are members of the union available equally qualified with nonmembers to perform the particular work required to be done and ready and willing to undertake it, provided that a man shall become eligible for employment as if already a member of the union if he shall bona fide give notice in writing to the secretary of the union of his desire to join the union, and shall pay or deposit with such notice the sum of 2s. 6d. (60c.). Such notice may be given by delivering the same to the secretary personally or by leaving the same at his office or by depositing the same in a box, which it shall be the duty of the union to keep available for that purpose at the place or one of the places appointed for the engagement of labor under clause 9 hereof.

Employers, in employing labor, shall not discriminate against members of the union, and shall not in the engagement or dismissal of men, or in the conduct of their business, do anything for the purpose of injuring the union, directly or indirectly.

When members of the union and nonmembers are employed together, there shall

be no distinction between members and nonmembers, and both shall work together in harmony and shall receive equal pay for equal work.

Strikes.—The union shall do all in its power to prevent any strike by any of the workers affected by this award, and if any strike shall occur in which any member of the union shall take part, such strike shall be prima facie evidence that the union has committed a breach of its duty hereunder.

Memorandum.—Preference to unionists has been granted by this award. In connection with this it is desirable to make it clear that an employer will only commit a breach of award if he employs a nonunionist when a member of the union, equally qualified to do the particular work to be done, is at the place of engagement ready to be engaged. In work such as that done in the port of Wellington, where the traffic is so largely carried on by steamers running to timetable, it is essential to the public interest that no delay should take place in the handling of cargo, and an employer, therefore, is not bound to wait for the arrival of members of the union. If they are not available when workers have to be engaged, the employer is free to engage any worker who is available.

It will be noted from the foregoing award that the court establishes the "open door" for the union, and that under the ruling it becomes impossible for a union to discriminate against applicants or to establish a monopoly of labor in any particular trade. It will also be noted that the court fixes a nominal entrance fee to the union as well as nominal weekly dues, so that it also becomes impossible for a union to fix a prohibitory fee with the view of limiting membership. This, of course, is a very different sort of unionism from that which prevails in other countries where unions can create a monopoly of labor by limiting membership, fixing prohibitory entrance fees or exacting impossible examinations as to technical trade merit. While under the award the shop, so to speak, may be "closed" the door of the union must be kept "open." This largely minimizes the objection of many American employers to the "closed" shop.

The attitude of the court on this point does not, however, meet with approval of some unionists as may be gathered from the following taken from the Waterside workers' report of New Zealand for 1906:

Preference to Unionists.—Mr. McLaren said that what they were asking for was that preference should be granted by Parliament, and not by the court. It was marvelous to him to find how the different trades unions had been satisfied with the position so long. The industrial conciliation and arbitration act was a direct encouragement to nonunionism as it now stood. Why should the nonunionist not share the responsibility of the unionist if he participated in his benefits? The act allowed the unions to bear the responsibility, and the leaders of the unions to bear the odium and censure, and sometimes boycott, and yet gave power to the court of its own free will to divide the benefits equally between the unionist and nonunionist.

* * * Mr. Young maintained that * * * trades unionism was a Christian work, and far greater Christian work was being done by the unions than by large number of the churches. The unionists of this country had sacrificed the issue of strikes, and in sacrificing that they had given to the employer absolute security for his capital. He could invest the capital wherever he chose in this country, knowing that it was absolutely safe against strike. He could arrange his contracts at a certain figure knowing exactly what he had to pay for his labor * * * He (the speaker) was aware of certain dangers surrounding the proposal of compulsory preference to unionists. Say that they had 1,000 men employed on the Wellington wharves, of whom 700 were unionists and 300 were not. Immediately they had

compulsion these 300 would come in, if they desired to get employment, but the employer had exactly the same grounds of operation as he had before they joined, when he took his choice, and thus the preference benefit immediately went. That could only be overcome by giving a union the right of excluding any one it thought fit. They must have the right to exclude, because if they got all the men into the ranks of the union, no preference could exist.

The following report of proceedings before an industrial council taken from the Auckland, New Zealand, *Herald* of May 10, 1909, will indicate how this vexed question of preference to unionist is dealt with by both parties and how by a method of compromise an agreement on the point is reached:

A KNOTTY POINT—VIEWS ON PREFERENCE.

The preference clause, to which the Auckland Butchers' Industrial Union of Workers asked the master butchers to agree at the sitting of the conciliation council yesterday, occasioned a good deal of discussion. The clause in question was: "Throughout all the departments recognized by this award preference of employment shall be given by employers to members of the Auckland Butchers' Industrial Union of Workers. When a nonunionist workman is engaged by an employer in consequence of the union being unable to supply a workman willing to undertake the work, at any time within twelve weeks thereafter the union shall have the right to supply a man capable of performing the work, providing the workman first engaged declines to become a member of the union. This provision shall also apply to those nonunion workmen already employed."

Mr. C. Grosvenor (employers' representative) asked what objection there was to the clause in the old award that "preference shall be given to members of the butchers' union, all things being equal?"

The commissioner (Mr. T. Harle Giles) said that possibly the brevity of the clause might lead to confusion. His interpretation was that, providing the union was prepared to find a man he must be taken if he was competent to do the work.

Mr. Grosvenor: That is so.

Mr. W. E. Sill (employees' representative): If the employer says the man is not competent?

The Commissioner: Then it is for the union to prove that he is.

Mr. Sill: That is very difficult to do. Continuing, Mr. Sill said the unionists' grievance was that employers were prejudiced, and nine times out of ten would choose a nonunionist. It would always be an open question when the union and an employer differed as to the competence of a man which was right.

Mr. S. Wing (employers' assessor): What about the men who refuse to join the union on conscientious principles?

Mr. Sill: I never met such a man.

Mr. Wing: I have.

Mr. Sill: I think it highly improbable there are such men. I met one who was supposed to have such principle, but I found the reason he did not join the union was that he thought the union would not do anything for him, as he was earning more than the award wages. He did not recognize that the union fixed a minimum, and that he could earn more than that if an extra good man.

The commissioner said he did not think employers wished to refuse to recognize the unions, which were of great benefit to the workers.

Mr. R. Salmon (employers' assessor): I think the time will soon arrive when all workers will be compelled to contribute to the union, and employers will be responsible for taking the contributions off their wages.

Mr. Grosvenor: A clause quite as rational as one of preference to unionists would be one that no man should work for an employer not a member of the master's union.

Eventually it was agreed that the clause should not apply to nonunion workmen already employed, and that the time during which the union could object to a nonunionist be confined to a week.

STRIKES.

For many years New Zealand was heralded throughout the world as "the country without strikes." Literally, this is not true. There have been strikes in New Zealand since the act went into force, but so few of them, comparatively, that it would be entitled to be called "the country with few strikes."

In New South Wales it is illegal to strike under any circumstances. Not so in New Zealand. The right to legally strike is not denied if certain formalities are gone through first, such as getting the union canceled. A man need not work, nor need an employer give him work if he does not wish to do so, but if either employers or workers agree or conspire together to commit a strike or a lockout while under an award, that is an offense. It is concerted action after having benefited by the privilege of going under an award that is reprehended.

Labor Secretary Tregear furnished the following statement of strikes since the act went into effect in 1894:

There have been twenty-five strikes in New Zealand since the inception of the industrial conciliation and arbitration act, involving approximately 1,146 strikers and rendering idle approximately 2,389 men. The total number of days the men were idle from their respective employments was approximately 318. As far as can be ascertained the total loss of wages to the workmen concerned approximated £17,679 ($85,744), while the loss to the employers was about £15,750 ($75,418).

In addition to these cases, there have been two or three disturbances since—one affecting the miners employed by the Taratu Coal Company, but it really was not a strike at all, as the men, being dissatisfied with the wages awarded by the court, simply left the service of the mine on a Saturday afternoon and did not return to work on the Monday morning, when the award became operative. The mine management subsequently filled their places with other miners in the district. In January there was a small strike of employees at the Paki Freezing Company's works, in which seventeen men were involved. The strike arose out of a dispute between the manager and the fellmongers as to the spell in the morning and afternoon in which to smoke. It was really a very trivial affair, but the men were proceeded against by the department and fined £1 ($4.85) each in the magistrate's court. There was also a strike of twelve butchers employed at the Picton Freezing Works in March of this year for higher wages. As these employees were not registered under the industrial conciliation and arbitration act it was not an offense. The men were only idle a very short time and accepted the wage of 11¼d. (22½c.) per hour, the same rate as paid to the Canterbury men. They were formerly paid 10½d. (21c.) and struck for 1s. (24c.) per hour.

You will see then that for a period of fifteen years, we have not averaged two strikes per year, and no doubt after the perusal of the facts furnished, you will come to the conclusion that some of the disturbances hardly deserve the name of a strike.

I may say that as far as the department can ascertain on the result of the strikes twenty-two were favorable to the men, namely, the men succeeded in getting their terms or something approaching them, and in three cases the employers were successful in defeating the demands of the men.

Most of the strikes which have taken place since the act went into effect were due, it is claimed, to the imperfect machinery provided for the administration of the law. The conciliation board provided for in

the original bill proved ineffective and was finally abandoned. This threw so much work on the arbitration court that it became hopelessly congested. Cases were kept on the court calendar for months and some of them for years. Meanwhile, the dissatisfaction of the men who could get no redress was intensified and they were goaded on to a final violation of the law.

Some of the testimony of labor representatives who appeared before the legislative labor bills committee in 1908, when the amendments since adopted, were under discussion emphasize this point. One labor representative said:

We consider that a number of the strikes that have taken place in New Zealand would never have taken place had there been machinery in existence whereby the disputes could have been settled without the delays that have occurred in the past. * * * We say, however, that no matter how drastic the clauses of an act may be, it would be impossible to prevent strikes altogether. You may lessen them by good legislation, but it would be impossible to prevent them.

Another labor representative spoke as follows:

It has to be remembered that no act passed by any legislature prevents crime. You can not stop the committal of murder, although a man can be hanged for it. You can not stop strikes by arbitration, although you can minimize them by means of arbitration, and we contend that the present act has done that.

Q. Are you aware that the majority of the workers are in favor of the arbitration act?

A. Yes, I do not think there is any doubt about it. Because a certain number like to override an award it does not follow that any one believes in strikes. No one believes in strikes that I know of.

In a speech delivered by Attorney General Findlay of New Zealand in Wellington in July, 1908, referring to the effect the act has had on strikes, he said:

* * * I contend that for many years the act had prevented strikes, and that if reasonably used in the spirit intended by its framer it would always prevent them. This contention has been adversely criticised. I submit these considerations to unbiased critics: (*a*) There were in 1906 290,000 wage-earners of all kinds in New Zealand, and the average number throughout the career of the act would be over 250,000; (*b*) Up to the present time there have been *eighteen strikes in thirteen years.*

Eighteen strikes have taken place in New Zealand, really all small and short lived, and only twelve of these have been illegal, since in six the act had no application. In these six there was no union award or binding agreement. In these illegal strikes, 740 men all told engaged, that is less than one third per cent of the above average total of wage-earners in this country, and of those engaged in strikes, legal and illegal, not one half per cent of these 250,000 workers. The days of idleness of workers due to these strikes were very few. In some cases the strike lasted only a day or two.

Now compare these figures with our motherland's experience. From 1891 to 1900, that is, ten years, there were 7,931 labor conflicts in Great Britain, involving 2,732,169 workers. It is estimated that the total wage-earners of Great Britain of all classes was in 1906 14,640,000, and during the decade in question would be about 12,700,000. Thus, during this decade over twenty per cent of the British workers were at some time or other directly concerned in a labor conflict, as compared with less than one half per cent in New Zealand in thirteen years.

The total number of days the British workmen were idle in these ten years owing to strikes (*i. e.*, multiplying the days idle by the number of men idle) was 106,192,528, making an average idleness of about thirty-eight days per man.

To treat the act as a disabled and useless machine because a few short-lived strikes have taken place, and a few very noisy gentlemen have declared that they will have none of it is therefore error. But let us be just before we are serious. Follow the career of the court and the act since their inception, follow the court's work to-day with a fair mind, and you will admit that it has done and is doing splendid work, discharging one of the most difficult tasks with fairness, ability, and patience. I claim that the act has done immense service in this country in the cause both of industrial peace and fair wages. That it is capable of improvement (as I hope to show) should not belittle that service.

Judge Sims, the president of the court of arbitration, said that there had been no real illegal strike in New Zealand for eleven months, and that in his opinion the new law will make for fewer strikes.

The president of the arbitration court in common with the government has made it plain that workers can not strike and have an arbitration act at the same time. They must choose between the two and with this point made clear and emphasized by recent inflicted penalties for illegal striking, there is every probability that unions will prefer to abide by the law. Labor leaders throughout the dominion are of this opinion. One of the most intelligent and aggressive among them said to me that under the amended law strikes will diminish, if not entirely disappear for the reason that to strike now means to lose the benefits of an award and to be fined besides.

A prominent public official said: "Public sentiment is against strikes, as it feels that it is 'welching' on the part of labor to strike after the good for labor that has been accomplished for it by the act and by the court."

EMPLOYERS' ASSOCIATIONS.

There has been a marked growth of these institutions since the act first went into force. In 1895 there was but one employers' association with a membership of 65. In 1906, the latest available figures, there were 113 employers' associations, with a membership of 3,276. Each center has its own organization under the direction of a capable secretary, and all of them are federated under a very capable general secretary, Mr. Pryor, who makes his headquarters in the capital city of Wellington. Such of the employers' associations secretaries as I had an opportunity of meeting impressed me with their intelligence, earnestness, and fidelity of purpose. The employers' associations secretaries usually act as the employers' representative before the industrial committees and before the arbitration court, where the unions are represented by their secretaries. The secretaries on both sides have developed into capable lay lawyers on labor laws. At such sessions of the arbitration court and industrial committees as I was enabled to attend, I was impressed with their knowledge of the law and their ability to expound it.

The following copy of an industrial council held in Auckland is taken from the Auckland *Herald* of May 18, 1909. It will illustrate the methods pursued at these conferences for the arriving at an agreement, and the part played in them by the union secretary, the secretary of the employers' association and by the commissioner, who under the law has no vote and acts simply as chairman of the conference:

TRIUMPH OF CONCILIATION—ANOTHER DISPUTE SETTLED—THE BUTCHERING TRADE.

The conciliation council met yesterday to deal with the dispute between the Auckland Butchers' Industrial Union of Workers and the Master Butchers' Union of Employers. A conference had been held between the parties and agreement reached on all points except the wages of order men and general hands, hours and preference. Mr. T. Harle Giles, conciliation commissioner, presided, and the employers' assessors were Messrs. J. W. Marks, S. Wing, and R. Salmon, and the employees' assessors were Messrs. G. Graulty, G. Lubbock, and J. Lindsay. Mr. W. E. Sill appeared for the employees and Mr. C. Grosvenor for the employers.

Mr. Sill stated that the union was not willing to make any concession on the points which were in dispute. Its final demands outstanding were that order men should be paid £2 12s. 6d. per week, general hands £2 10s., and that preference should be granted to unionists, as in recent awards. As regards the half-holiday the employees stuck to the clause in their original demands as follows: "Employers during any week in which a holiday or holidays occur may give their workers the extra time off necessary to comply with the limit as to hours fixed by the award during such holiday week, or the next following week." If these demands were granted the union would be willing to allow the whole agreement to go forward as the recommendation of the council; if not, it would withdraw the whole agreement. A new clause the union wished to have added was that overtime should be paid for at time and a half for other than preservers. This new clause was agreed to.

Mr. Wing suggested, on behalf of the employers, that a sliding scale be agreed upon for order hands, £2 5s. being paid for men from twenty-one to twenty-three years of age, and £2 12s. 6d. for men over twenty-three.

After some discussion, Mr. Lindsay, on the commissioner's suggestion, offered on behalf of the union to accept £2 5s. for order men up to twenty-two years and £2 12s. 6d. thereafter.

Considerable debate took place on the question of hours. The men had originally demanded a forty-eight-hour week, while the employers held for a fifty-nine-hour week. The parties eventually narrowed the margin down to one hour, one side holding for fifty-six and the other for fifty-seven hours, and the court adjourned to allow the parties to deliberate.

On resumption it was agreed to compromise on wages and hours as follows: Order men between twenty-one and twenty-three to receive £2 7s. 6d., and over that age £2 12s. 6d.; general hands, £2 10s. per week, the number of weekly hours being fifty-six.

Late in the afternoon all the clauses were agreed to, and the agreement will be sent forward to the arbitration court as the recommendation of the council.

At the conclusion of the sitting Mr. Sill remarked that to the commissioner was due the entire credit for bringing the matter to so satisfactory a termination.

Mr. S. Wing said had it not been for Mr. Giles no agreement would have been arrived at. He moved a hearty vote of thanks to the commissioner.

Mr. Lubbock seconded the motion, which was carried with acclamation.

In returning thanks the commissioner said it was the toughest dispute he had yet met.

On the motion of the employers' representatives, a motion appreciative of Mr. W. E. Sill (workers' representative) was passed, and, on the motion of the employees' representatives, a similar vote was passed to Mr. C. Grosvenor, employers' representative.

THE AGREEMENT.

The following is the full list of weekly wages agreed upon: First shopman, £3 5s.; second shopman, £2 15s.; small goodsmen, £2 12s. and £2 5s.; cellarmen and packers, £2 15s. and £2 5s.; bacon-curers, £2 15s. and £2 7s. 6d.; head, feet, and tripe hands, £2 7s. 6d. and £2 2s.; boners, £2 7s. 6d.; men in charge of hawking carts, £2 17s. 6d.; drivers, £2 6s. to £2 10s.; ordermen, 21 to 23, £2 7s. 6d. over 23, £2 12s. 6d.; general hands, £2 10s. Boys and youths over 14 and under 15 years, 10s. per week: 15 and under 16, 12s. 6d.; 16 and under 17, 15s.; 17 and under 18, 20s.; 18 and under 19, 25s.; 19 and under 21, 30s.

Meat preservers, £3; extractors (first), £2 5s.; extractors (second), £2 2s.; cutters, £2 6s.; fillers, £2 6s.; scalers, £2 2s.; toppers, £2 2s.; pressers, £2 2s.; solderers, £2 5s.; solder spiriters, £1 12s.; tin-cleaners, £1 12s.; tin-washers, £1 12s. Casual labor (adult) to be paid at a minimum rate of 10s. per day for ordinary days and 12s. for Saturdays.

When a public holiday occurs on any day other than Saturday, employees may be called upon to work up to three p. m. on such Saturday holiday.

The award will apply to the whole of the northern industrial district outside Poverty Bay, and shall remain in force until December 31, 1911.

ARBITRATION COURT AWARDS.

The following report prepared by the Labor Department for the Minister of Labor gives the history of the awards granted by the court of arbitration:

The Hon. the Minister for Labor.

The following figures have been compiled for the award return which I sent you last week, and may prove of interest and service to you.

At the beginning of September 303 awards or agreements were enforced throughout New Zealand, and were divided among the several districts as follows: Northern district (Ak.), 69; Wellington, 63; Canterbury, 73; Otago and Southland, 70; Taranaki, 6; Marlborough, 2; Nelson, 9; Westland, 11.

In no less than 102 awards or agreements the arbitration court gave either an increase of wages or less hours over the conditions given by previous awards. In some cases both increased pay and shorter hours were granted. These awards which gave better conditions are divided into districts as follows: Northern, 28; Wellington, 23; Canterbury, 26; Otago and Southland, 24; Westland, 1.

In 90 of the 102 awards increased wages were given to journeymen, and the average increase is estimated at ten per cent over rates paid under original awards. (It must be remembered that the wages paid prior to the act coming into force were, generally speaking, *less than* the amounts subsequently given by the boards and court.)

The increased wages amounted in one case (tailoresses, Auckland) from 17s. 6d. ($4.20) (awarded in 1897) to 25s. ($6.00) per week (awarded in 1904)—a rise of 43 per cent.

The lowest increase was that given to the timber yards and coal carters of Canterbury (Ashburton), who received an increase of 1s. (24c.) per week on an average wage of 44s. ($10.56) or about two and a third per cent.

The greatest drop in hours worked is shown in the Auckland city drivers' award—from fifty-four hours in 1899 to forty-seven and a half hours in 1906. The division of hours under the various awards and agreements in force are approximately as follows: Not fixed, 26; 44 hours and under, 60; 48 hours and under, 242; 52 hours and under, 26; 60 hours and under, 41; 70 hours and under, 9.

In several awards the hours worked by men and women vary. Both classes are included in this return. The hours above 52 are those fixed for such callings as cooks and waiters, cabmen, drivers, dairymen, grocers, butchers, hairdressers, etc.

The figures show that there are 302 cases where the hours have been fixed at forty-eight per week and under, while there are 76 cases fixing fifty-two hours and

under, therefore, almost seventy-five per cent of the existing awards fix an eight-hour day or less.

Comparing the rates of weekly wages paid in the various awards, the result is as follows: ($9.60) 40s. and under, 13; ($10.80) 45s. and under, 95; ($11.52) 48s. and under, 73; ($13.20) 55s. and under, 150; ($14.40) 60s. and under, 123; ($15.84) 66s. and under, 44; ($16.80) 70s. and under, 23; ($18.00) 75s. and under, 12; ($19.20) 80s. and under, 7.

In cases where different wages are paid under one award (such as the typographical, bakers, butchers, coal miners, etc.) the various minimum wages are included: for instance, bakers, first hand, 63s. ($15.10); second hand, 53s. ($12.72); third hand, 48s. ($11.52), are shown in respective columns. Seamen, cooks and stewards, waiters, slaughtermen, shearers, wharf laborers, and others, have not been dealt with, as the rates paid are (1) very low; (2) employment is intermittent; or (3) piece rates are paid.

In 181 cases the wages paid are 48s. ($11.52) and less; while in 359 cases an average of 55s. ($13.20) and over is paid, or in other words, fifty per cent of the awards compared show that a weekly wage of 55s. ($13.20) and over is fixed as the minimum.

In fifty instances the awards of the court have remained stationary, that is, neither the hours nor the wages have been altered by subsequent decisions. Ten awards are classified as being difficult to compare with similar awards given previously, and in 136 cases one award or agreement only exists. The court has in five cases awarded less favorable conditions, *i. e.*, lower wages, or increased hours.

THE EFFICIENCY OF NEW ZEALAND LABOR.

Much complaint is heard among New Zealand employers to the effect that one evil consequence of the act is the diminished efficiency of labor, for which, as a rule, employers hold the act responsible.

In the evidence offered by employers before the labor bills committee of Parliament in 1908, the following testimony was brought out, bearing on this point.

Mr. Prior, secretary of employers' association, said:

I was recently conducting a case for the employers before the arbitration court, and got it from a witness on oath that the secretary of the union had gone around among the workers and told them not to hustle, as the award fixed their wages, the wages were not dependent upon the amount of work they did.

A builders' representative testified as follows:

We find in our particular business that although the worker's wages have not increased more than about ten per cent on what they were twelve or fourteen years ago, his efficiency or the amount of work we get done is not more than fifty per cent of what it was twelve years ago. I will tell you why, if I may mention an instance. About fourteen years ago I had a contract and allowed 6s. ($1.44) per foot for labor on raw material, made a profit of 6d. (12c.) out of that, while I have frequently allowed ten shillings now ($2.40) for the same amount of work and made a loss, although it is exactly the same class of work. That simply goes to show that there is less work being done by the worker now than there was twelve years ago, while the wages have not increased probably more than ten per cent. That accounts in a very large degree for the increased cost of building.

The testimony of Mr. George T. Booth, an ironmaster of Christchurch, was as follows:

I am quite sure that the cost of the arbitration system has resulted in a loss of industrial efficiency far greater than ever resulted from strikes, or than was likely to result during the period the arbitration system has been in operation.

Q. Do you mean to say that the moral fiber of workmen generally has deteriorated?
A. Yes, it has been deteriorating for many years past.
Q. Are there any causes outside of what you have been discussing?
A. Yes.
Q. Can you name them?
A. I think that some of the false social ideals that are being preached here have had a considerable amount to do with it.

Mr. Booth further testified before this legislative committee that in his trade, the engineering, there had been a falling off in the workman's efficiency of twelve per cent in 1905 as compared with 1901. He gave facts and figures to prove his statement, taken from the New Zealand government reports which give the wages paid and the output.

On the other side statements are made by labor representatives denying these charges. One labor representative pointed out that the present competition among the workers is keen enough to insure that each worker is required to put his utmost into the day's work. At a trades council conference one of the delegates said:

Some years ago, when I was working in the timber industry, we thought it was an extraordinary tally for a man to turn out 8,000 feet a day—that was 1,000 feet an hour. Later on men turned out 10,000 feet a day for a month. I took the tally myself and the average was 10,000 feet a day for the nineteen days that the mill worked. There is a practice of playing one mill off against another, and if one mill turned out a large quantity another would try to beat it. We heard of one man turning out 16,000 feet, and that record stood for a considerable time, but eventually we had a benchman who turned out 22,000 feet, and when the case was being tried at Invercargill last week, we heard the extraordinary story of a benchman who turned out 28,000 feet.

Q. Is the general average about 8,000 feet a day?
A. The average per day is very much in excess of what it was many years ago.

Labor Secretary Tregear, on being invited to express an opinion on this point, said:

This is a vexed question. Some employers declare that the act has diminished the efficiency of labor, and quote figures to prove their assertions. I doubt both their alleged facts and figures, preferring to take the official figures in the Yearbook. This states, 1908 (page 346), that the wages in factories rose in five years at the rate of thirty-five per cent, and that the value of the produce or output in these factories (top of page 347) rose thirty-one per cent. This slight difference may be accounted for thus: The employment of some thousands more of hands does not always mean a proportionate increase of output. If you employ a hundred men in your factory and they give you an income of £1,000 a year, it does not follow that by putting on two hundred men you can get £2,000. There may not be the machines to work on or the market to sell the goods. So, likewise, it does not follow because you can get ten knots an hour out of a steamer by burning one ton of coal an hour that you can get thirty knots by burning three tons. I consider thirty-one per cent rise in production a very fair equivalent for thirty-five per cent rise in wages. It seems to me this settles the question both of efficiency and of the "going easy" accusation against New Zealand workers.

The figures above quoted by Secretary Tregear would show a decline of over eleven per cent, which rather supports the contention made by Mr. George T. Booth before the legislative committee that there had

been a decline in efficiency in the engineering business in five years of twelve per cent. The Yearbook figures would indicate that this decline would apply generally.

While the facts show that there has been a diminished efficiency in recent years on the part of the worker in New Zealand, the cause for this result, as I shall endeavor to show later in this report, is not correctly understood. I hope to be able to make clear that this diminished efficiency has little or no relation to the labor legislation enacted in New Zealand. Diminishing efficiency is complained of in trades and industries in New Zealand that do not come under the act. A big bridge builder and contractor in New Zealand made to me the statement that his men are not unionized nor are they working under an award, yet he finds a diminishing output compared with previous years of fully ten per cent.

HAS THE ACT MADE FOR STEADINESS IN BUSINESS.

There are those who claim the act has unfavorably affected the steadiness of business. I could find no evidence of this; on the contrary, it seemed so far as I could discover, to have the opposite effect and to establish conditions that afford a higher degree of protection to the employer than is found in most other countries. The awards are generally made for extended terms, usually for two or three years and the court does not favor frequent or violent charges. In countries where strikes and lockouts prevail the employer has no such protection. An award once made, the New Zealand employer can safely rely on the wage established for the life of the term of the award, subject of course in good times to competition among employers for labor of higher efficiency, which often commands a premium over the minimum wage.

THE CREATION OF NEW CRIMES.

One criticism that I frequently heard made on the act is that it has created new crimes. It is true that the law makes the strike or the lockout a punishable offense. In return for this the employer, the worker, and the public get a higher degree of industrial peace than is found in other countries.

PREVENTING MEN FROM WORKING EXCEPT ON COURT TERMS.

The act of course prevents men from working except on terms fixed by the court. This is hardly avoidable under any system of collective bargaining, whether such collective bargaining be legalized by the state or established by a strong union. The system is likely to work a hardship on the few inefficient or slow workers, but it tends to insure a fair wage to the great body of workers. Thus making for the greatest good to the greatest number. As previously explained, the slow worker

is not ignored by the law, but a provision is made whereby he can be given a certificate permitting him to work below the fixed wage. It is pointed out that this is a far safer plan than to permit the few to endanger the wage rate of the many.

INTERFERENCE WITH PRIVATE MANAGEMENT ON THE PART OF THE COURT.

This is another criticism that the investigator frequently hears brought up against the act. It is admittedly true that to the extent of fixing wages and conditions under which men shall work there is an interference on the part of the court. Under modern labor unionism no employer can longer hope to be supreme in dictating the wage the worker shall receive or the conditions under which he shall work. When these matters were solely in the hands of the employers, experience has shown that the unfair among them abused the privilege and crowded the worker down oppressively, compelling his fairer minded competitor to follow his example or go out of business. The question then remains, shall the wages and conditions be fixed almost solely by the worker through his union, which is often the case where the union is strong, or shall a fair-minded and disinterested court hear both sides and fix a wage fair to both, and working conditions fair to both? Aside from wages and working conditions the arbitration court does not in any way interfere with private management or control.

CAN THE DECISIONS AGAINST THE MEN BY THE ARBITRATION COURT BE ENFORCED?

Wherever the question of compulsory arbitration came up for discussion in the countries of Europe where I made my investigations, the point was invariably made that compulsory arbitration was doomed to ultimate failure, because in the nature of things the court decisions could be enforced against the employer because he is a responsible party, but that they could not be enforced against the worker because he is financially irresponsible, nor could he be made to work by any court anywhere if he did not want to work. The facts are that the decisions can not be enforced against the employer if he chooses not to continue operating for the reason that the decision of the court is likely to make his venture unprofitable and no arbitration court would attempt to punish him for this. While it is true on the other hand that the court can not compel the members of a union to work if they choose not to work, the court can penalize them for collectively quitting work in order to evade the award. Instances were brought to my notice where the Wellington union, the Waihi gold miners, and the federated seamen went on with their work despite the fact that they considered the court award hostile to them.

Ample evidence was also furnished to prove that the court can and has punished men for striking. In the slaughtermen's strike of 1907, 266 men were fined for striking illegally, and 123 men paid their fines in full. The total amount collected in this strike to date is $3,776. And the end is not yet. Nearly two years have elapsed since the strike took place, but the administration is unrelenting in following up the fugitive strikers, as will be noted from the following clipping taken from the Auckland, New Zealand, *Herald* under date of May 14, 1909:

THE SLAUGHTERMEN'S STRIKE.

(By Telegraph—Press Association.)

CHRISTCHURCH, Thursday.

Order for attachment of the wages of two slaughtermen who took part in the slaughtermen's strike and failed to pay the fine imposed by the arbitration court were to-day made absolute by Mr. Day, S.M. In one case the order amounted to £5 and in the other to £2 10s.

On the other hand, the administration just as readily brings the defaulting employer to time, as may be noted from the following clipping which, by a striking coincidence, appeared in the same issue of the same paper:

FLAXMILLERS' TROUBLES.

(By Telegraph—Press Association.)

PALMERSTON NORTH, Thursday.

The Department of Labor has notified Messrs. Broad and Neaves, flaxmillers, that it is intended to take legal action against them for alleged breaches of the Manawatu flaxmill employees' award: (1) For dismissing men because they were entitled to the benefits of an award; (2) for breach of the preference clause in taking on nonunionists when unionists were available. The department also proposes to apply to the court for interpretation to test the validity of contracts signed to scutch flax at a lower rate than is provided by the award. The cases will be heard by the arbitration court.

The Black Ball coal miners' strike on the west New Zealand coast was a case where the men tried to evade the penalty imposed upon them for illegal striking. Their effects were sold by the sheriff. There were, so to speak, no bidders as the men were determined to try and defeat the law. The entire effects of the strikers realized at the sale but $3.00. The full penalty was, however, finally collected by attaching the wages of the individual workers and amounted to $1,820.

The Wellington bakers' union struck against a court award and lost the strike. The union was fined and paid a penalty of $485. So far as I could learn the court has in every instance enforced its awards against the men.

DISCOURAGING THE INVESTMENT OF CAPITAL UNDER THE ACT.

This was another criticism frequently made against the act. Men, I was told, would not invest their money where such drastic labor laws prevailed. Hence the growth of industry had been checked to the

injury of the worker and the dominion. Doubtless there have been instances, possibly fairly numerous ones, where men have refrained from investing in industrial enterprises in New Zealand because of its labor laws. If so, New Zealand has not a monopoly of this experience. England has no legal minimum wage nor has it a compulsory arbitration law, yet the same complaint on a far greater scale is made there, as is evidenced by the following statement quoted by Secretary Broadhead, of the Christchurch Employers' Association.

THE WANT OF CONFIDENCE.

In a recent speech in the House of Lords, Lord Cromer referred to the present want of confidence in Great Britain. He said there never was a larger amount of capital in the country to be invested. Among competent authorities the lowest estimate was £250,000,000 ($1,200,000,000) a year, and yet that vast accumulation of capital was not invested in industrial concerns in the country. Mr. Haldane, a member of the British Cabinet, when speaking a few months ago, declared his conviction that at the root of future British prosperity lay the question whether they could hold their own in the scales of nations. At that moment he said there was plenty of capital available, had the people only confidence.

How often do we hear men of means in our own State of California, as well as in other states of the union, say that they would not think of putting money in to any enterprise requiring much labor, because of the alleged tyranny and despotism of labor unions. And yet, we have no legal minimum wage nor compulsory arbitration laws in our country.

That there has been material growth in New Zealand industries since 1901 is demonstrated by the following figures taken from the New Zealand Yearbook for 1908:

	Value of land, machinery and buildings.	Hands employed.	Output.
1901	£8,408,564	46,847	£17,853,133
1905	12,509,286	56,359	23,444,235

The same Yearbook, page 522, gives the bank deposits for 1880 as £18 per head of the mean population, and £19.92 per head in 1890, and £20.39 in 1900, and £25.59 per head in 1907.

Secretary of Labor Tregear made the statement that private wealth in New Zealand rose from £170,000,000 in 1896 to £304,654,000 in 1906. "A pretty good rise in ten years," Secretary Tregear adds, "for a place where capital is being driven away." In this he quotes the figures shown on page 537 of 1908 Yearbook.

THE EFFECT OF THE ACT ON IMPORTS.

Another criticism made against the act is that it has increased imports out of proportion to the home production. There is no doubt that imports, as a rule, have grown faster than factory products in New Zealand. The cause, however, so far as I could ascertain has little to

do with the act. The reasons for this growing difference between imports and home production vary in different industries. In the products of steel and iron, where this gap is quite noticeable, the point was made by an ironmaster, who is most unfriendly to the act, that after visiting the United States a year or two ago and inspecting some of the colossal machine works of that country where they specialize on a very few things and grind them out by the tens of thousands, he realized how impossible it is, even in the face of a fairly high tariff, for the New Zealand ironmaster successfully to compete with those conditions.

In the course of my investigations I met several manufacturers who assured me that since the introduction of the act the manufacturing end of their business had declined and their imports had increased, notably in machinery, textile fabrics, and wearing apparel. This is made very plain by the following figures quoted by Secretary Broadhead of the Christchurch Employers' Association and taken from the New Zealand Yearbooks of 1895 and 1905.

Tables showing total value of importations of three important manufactures for the years 1895 and 1905, the value of similar goods manufactured in New Zealand, and the percentage of increase in importations since 1895, as compared with the percentage of increase of New Zealand manufactures:

IMPORTS.

Goods.	1895.	1905.	Increase.	
Boots and shoes	£127,985	£300,134	£172,149	134 per cent.
Woolens	254,580	479,986	225,406	88 per cent.
Machinery (including agricultural implements)	258,799	768,550	509,751	190 per cent.

NEW ZEALAND MANUFACTURES.

Goods.	1895.	1905.	Increase.	
Boots and shoes	£357,806	£501,065	£143,259	39 per cent.
Woolens	302,423	397,348	94,925	31 per cent.
Machinery and implements	102,054	199,741	97,687	95 per cent.

It will be seen from above that the excess per cent of importations over local manufactures in 1905, as compared with 1895, was as follows:

Boots and shoes	95 per cent.
Woolens	57 per cent.
Machinery and implements	95 per cent.

I am of the opinion as the result of my investigations, that had there been no act, substantially the same results would have followed. New Zealand can never within reason hope to become a great industrial country. Her possible market is too limited to permit her to specialize on a sufficiently large scale successfully to compete with the world's great industrial centers. Only by putting on a burdensome and prohibitive tariff can she hope to keep out foreign manufactures. Such pro-

hibitive tariff would largely defeat its purpose by so greatly raising the price of things as to limit the demand. The great increase in the import of woolens is largely due to the years of great prosperity which materially increased the purchasing power of the people and created a demand for finer and more fashionable goods than can be satisfactorily produced in New Zealand. Most retail dealers want exclusive styles, such as the home manufacturer is not in a position to give, hence orders are sent abroad in preference. To illustrate, in speaking with the leading merchant tailor of one of the New Zealand cities, I asked whether New Zealand produced a good quality of woolens; he replied that it did. "Are the prices reasonable?" I further inquired. "Quite so," he assured me. "I presume, then, that you confine your purchases of woolens altogether to New Zealand productions," I ventured. "Not at all," he replied. "Most of my woolens are imported from England and elsewhere." Expressing my surprise at this statement, he explained that if he confined himself to New Zealand woolens, he would, so to speak, be eating out of the same pan with his competitors. Whereas, in his business, it was very important that he should be able to show designs not obtainable elsewhere. To enjoy this advantage he must buy abroad, where the assortments were so varied that he could get exclusive patterns. Yet another illustration. In speaking with a prominent New Zealand shoe manufacturer, I asked if the act was responsible for the fact that the local manufacturing of shoes had not kept pace with imports. He answered, saying "the act had nothing to do with it. It is this way," he went on. "Despite the fact that we have one of the largest shoemaking plants in the dominion, we can not in many lines, even with the protective tariff, compete with American or European specialty manufacturers. Why, in your country I have been in factories where thousands of hands are employed making nothing else but shoes to be retailed at three dollars a pair. How can we hope to compete with such conditions, in the face of our limited market, which compels us in our one factory to make everything from a baby's shoe to a plough shoe? Furthermore, we are faced by this insurmountable condition. A local dealer will agree to give us an order if we will promise to give him the exclusive sale of a particular last for his city, explaining that otherwise he would be thrown into competition with his next door neighbor or his other competitor on the opposite side of the street, which would mean that his profits would soon be cut to pieces. When we explain that his output at best is too limited to justify us in confining our sales for the whole city to him alone, because that would mean still further minimizing our limited market, he, as a rule, declines to place the order and gives it instead to the representative of some foreign manufacturer,

who has a world-wide market and whose variety of lasts is so broad, that he is in a position to give each customer exclusive styles. This is a condition that we can not meet nor overcome, and, as a consequence, if you visit the retail shoe shops in our cities, you will find that eighty per cent of the shoes on their shelves are of foreign manufacture. The home factories are used by the dealers to fill in on sizes in transit and for the coarser lines of goods."

ARE THE NEW ZEALAND CITIES AND TOWNS GROWING AT THE EXPENSE OF THE COUNTRY?

Yes. This is as true here as it is in most other countries. It is not clear to me how the act is responsible for this, unless it may be held that the more favorable conditions for workers established by law and the higher wages that good times have brought have naturally tended to tempt the country worker to seek these advantages in the cities.

The New Zealand government is endeavoring to counteract the tendency of the country worker coming to the cities by its settlement act, which was created for the purpose of encouraging settlement on the land. Premier Ward informed me that in the last twelve months the government has advanced to agricultural settlers nearly $9,000,000.

THE EFFECT OF A LEGAL MINIMUM WAGE ON NEW ZEALAND.

There are wide differences of opinion in New Zealand as to the result of the legal minimum wage. The "pros" and the "cons" on the subject are as opposite in their opinions as to the effect of the minimum wage as it is possible for men to make them. Here are the views of some opponents of the idea:

A leading business man—

The minimum wage drives out the slow worker and pulls down the efficiency and the earning power of the man above par.

A secretary of a builders' association—

Where a low minimum wage is fixed, as in the grocery trade, there is room for differentiation of wage on merit. But where the minimum wage is high there is no such room, hence it makes for the dead level at the expense of efficiency.

A leading merchant—

The minimum wage tends to leveling down process instead of a leveling up.

The manager of a meat company—

If we pay above the minimum wage the court at the next revision of the award is likely to make the maximum the minimum wage to be paid, hence we can not afford to take this risk, and so the minimum practically becomes the maximum wage at the expense of the efficient worker who is thus kept down.

A manager of a large transportation company—

I believe that the minimum wage makes for the dead level and a diminishing output. I pay my men strictly according to the minimum wage.

A president of an employers' association—

Green hands, under the legal minimum wage, find it very difficult to get employment. The poorer workers fix the standard of output under the system; the fast workers are held back by an unwritten law.

A building contractor—

The minimum wage prevents many men out of work, who would be glad to otherwise accept less, from getting employment.

Attorney General Findlay, in a speech delivered at Wellington, June 17, 1908—

Although the wage fixed by the court is merely the least the employer is allowed to pay, it is in general practice the highest the employer will pay. The result of this has been a marked tendency toward a uniform or dead level wage in each trade, for all workers good, bad and indifferent. I need not dwell upon the evils of such a tendency. It has tended to deprive skill, care and industry of the reward and encouragement essential to their exercise, and the dead level wage tends to impress itself on the energy of the worker.

Here are some views that are quite the opposite to the foregoing:

An employer and ex-member of Parliament—

The minimum wage does not make for the dead level. A goodly percentage of the men receive more than the minimum wage. The dead level is created only where the employer takes advantage of the legal minimum and reduces all his men to that level, regardless of their efficiency. Few employers, however, are so shortsighted.

A furniture manufacturer—

The dead level of wages does not exist in the furniture making business. Men are paid according to their value regardless of the legal wage. But, of course, never below the legal rate.

A secretary of an employers' association—

The minimum wage admittedly protects the fair against the unfair employer.

A business man—

The minimum wage is a safeguard against workers being sweated in hard times.

A shoe manufacturer—

The minimum wage does not make for the dead level in the shoe manufacturing trade. Men in this trade are paid as much above the minimum wage as they can make themselves worth.

A master baker—

The minimum wage checks the downward wage limit in bad times, but puts no limit on an upward wage trend in good times.

A member of Parliament (Labor representative)—

The fixing of a minimum wage does away with sweating, increases the purchasing power, and has led to the general improvement of the worker.

A secretary of a labor union—

The legal minimum wage is, in my opinion, alone responsible for the increase in wages among unskilled workers. There is never any shortage in this class of labor, and through competition the tendency was toward a gradual lowering of conditions among such wage-earners. Without state intervention and the fixing of a minimum wage many adults would have been forced out of the skilled trades and their places filled by youths and a class of workers known as "improvers."

It can readily be seen how difficult it would be for an investigator from abroad to reach an intelligent conclusion from these widely conflicting opinions, all of them I am sure given in good faith and expressing the honest opinions of the speakers. There were no facts available to demonstrate what were the actual results on the question as to whether or no the minimum wage made for the dead level of wage, and as to whether it was true that the good worker was discouraged by being pulled down to the level of the poor worker. From talking with employers of unskilled workers I became reasonably satisfied that in the unskilled trades the minimum wage, as a rule, became the maximum wage. This, however, I could readily understand from the fact that the legal minimum fixed by New Zealand law is, so far as I know, the highest average wage paid in the world for unskilled labor. The rate being about two dollars a day or an average of twenty-four cents an hour, against an average in the United States of nine cents an hour for general laborers and twenty-eight cents an hour for building laborers or a general average for both of sixteen and one half cents an hour.

I also became reasonably satisfied that the minimum became, as a rule, the maximum wage in the shipping trades and on street car lines. In the case of the latter employment, however, the law provides an increasing scale based on years of service.

I further became fairly well satisfied that in the building trades a very large proportion, say, seventy-five per cent of the workers, received the minimum wage. The very conflicting opinions as to factory wages made it impossible to reach an intelligent conclusion in that direction. In my perplexity I appealed to the Secretary of Labor, Edw. Tregear, who kindly offered to have the factory schedules on file in his department, which give the number of factory employees, the wage fixed by law and the actual wage paid, compiled, so that the actual facts would be made available. The following results were a revelation to all interested parties:

DEPARTMENT OF LABOR, WELLINGTON, 20th May, 1909.

Dear Colonel Weinstock.

In respect to the figures which we are getting out in regard to the payment of the minimum wage, I may say that the following totals have been ascertained for the four chief centers of New Zealand:

AUCKLAND CITY.

Total number of employees, excluding underrate workers and young persons	2,458
Number receiving the minimum wage	948
Number receiving in excess of the minimum	1,510
Per cent receiving in excess of minimum	61

Trades not comparable: Boat building, bread and pastry baking, brick and tile manufacturing, butchers' small goods, flour milling, and freezing works employees.

WELLINGTON CITY.

Total number of employees, excluding underrate workers and young persons	2,066
Number receiving the minimum wage	876
Number receiving in excess of the minimum	1,190
Per cent receiving in excess of minimum	57

Trades not comparable: Aerated waters, bacon curing, blacksmithing and farriery, brass founding, bread and pastry baking, brickmaking, butchers' small goods, engineering, fellmongering, gas manufacturing, meat freezing, and wax vesta manufacturing.

CHRISTCHURCH CITY.

Total number of employees, excluding underrate workers and young persons	2,788
Number receiving the minimum wage	1,127
Number receiving in excess of the minimum	1,661
Per cent receiving in excess of minimum	59

Trades not comparable: Aerated waters, blacksmithing, bread and pastry baking, brewing and malting, butchers' small goods, general engineering, flour milling, gas manufacturing, and rope and twine manufacturing.

DUNEDIN CITY.

Total number of employees, excluding underrate workers and young persons	1,637
Number receiving the minimum wage	792
Number receiving in excess of the minimum	845
Per cent receiving in excess of minimum	51

Trades not comparable: Bread and pastry baking, butchers' small goods, engineering (all branches except molding and boilermaking), flour milling, gas manufacturing, meat freezing, and sail and tent manufacturing.

Full details of each trade will be published in the annual report of the department, which should be ready about a month hence. I thought these totals would be sufficient for your purpose until the report itself is issued, when (if you will give me your address) I shall send you a copy.

The result appears to me to be very satisfactory, showing as it does that a larger number of employees receive above the minimum wage than the minimum itself, in the manufacturing industries of New Zealand.

Believe me, yours very faithfully.

EDW. TREGEAR, Secretary for Labor.

These facts make plain that in the industries covered by the foregoing advance report, over fifty-eight per cent receive a higher wage than that fixed by law, thus exploding the criticism that in New Zealand the minimum wage makes, as a rule, for the dead level, thereby pulling the efficient worker and his wages down to the level of the poorer worker.

No figures are available at this writing to show the percentage of increase in wages above the minimum received by these fifty-eight per cent of factory workers. From data furnished by the president of the shoe manufacturers' association of New Zealand I was enabled to work out this information for the shoe industry and found that it averaged 16.4 per cent. That is, some shoemakers receive as little as five per cent above the minimum and some as high as fifty per cent above said minimum. The average for all being as stated 16.4 per cent.

It must, therefore, be evident that in the manufacturing enterprises

in New Zealand the merit system largely prevails, and while the employer under the law can not pay less than the legal wage, many pay above the legal wage, thus holding out a strong incentive for higher efficiency.

HAS THE ACT INCREASED THE TAX BURDENS OF THE PEOPLE?

Critics of the New Zealand act take much satisfaction in pointing to the seemingly abnormal increase in the debt of the dominion since the creation of the act in 1894 and maintain that this is due to the desperate efforts of the administration to create public work in order to relieve the labor market of unemployed so that the wages fixed by the awards might be successfully maintained. These critics call attention to the fact that in 1894 the dominion debt was £38,000,000 or a per capita debt of £57 8s. 10d. ($278.57), whereas in 1908 the debt of the dominion had grown to £66,000,000 or a per capita debt of £66 ($320). I took pains to have these statements analyzed with the following results: I found that in 1894 out of the debt of £38,000,000 there was invested in productive works £17,162,000 leaving a non-productive debt of £21,838,896 ($105,914,300) on which the people had to pay interest, whereas in 1908 the investment in productive works aggregated £47,416,743 leaving a non-productive debt of £19,047,154 ($92,378,697). So that as a matter of fact the debt on which the people have to pay interest had, in the intervening years diminished by $13,535,603. The productive investments yield the dominion an income of from three to seven and one half per cent and go a good way toward lightening the tax burdens in other directions.

Following are the productive investments for the two foregoing periods as furnished by Colonel Collins of the treasury department at Wellington:

	1894.	1908.
Railways	£14,600,000	£27,000,000
Advance to settlers	----------	4,100,000
Advance to workers	----------	205,000
State lands	1,300,000	5,890,000
Advances to municipal bodies	----------	2,881,000
Bank of New Zealand	----------	500,000
Coal mines	10,000	100,000
Telegraph and telephone	680,000	1,196,000
Cash on deposit in London	----------	114,743
Water works, gold mines	572,000	815,000
Cash on hand	----------	1,015,000
Reserve fund securities	----------	865,000
New Zealand consuls	----------	478,000
Land purchases	----------	2,247,000
	£17,162,000 ($83,236,700)	£49,406,743 ($229,922,704)

CONCLUSIONS.

Before beginning my investigations of the operation of the New Zealand act, I compiled a statement of all the adverse criticisms that had come to me from various sources in and out of New Zealand.

I then undertook the task to verify and analyze these adverse comments, which in brief were as follows:

The act has made—

(*a*) For an abnormal increase in wages;

(*b*) For an increased cost of living;

(*c*) For friction between employers and their men;

(*d*) For diminished efficiency on the part of workers;

(*e*) For lessened output;

(*f*) For increased taxes;

(*g*) For increased imports out of proportion to home manufacture;

(*h*) For driving capital away from investment in industrial undertakings;

(*i*) For a refusal on the part of the workers to abide by unfavorable court decisions;

(*j*) For penalties against the men for violations of awards, which the court can not enforce.

These criticisms looked most formidable, and if found to be true criticisms, it must be obvious that the law is a serious detriment to the dominion and sooner or later must go.

My investigations, however, forced on me the conclusions that many of these criticisms were unfair to the act and held it responsible for results with which it was in nowise related, as in other parts of this report I have endeavored to point out.

Passing them in final review, it must be said that while wages have gone up in New Zealand, the act has been responsible for putting up wages almost entirely in the sweated industries, where the weak and the unorganized were being helplessly exploited and where wages *should* have been put up.

In other branches of trade, the act has had very little effect on the upward trend of wages which had risen the world over, and which would have risen in New Zealand, act or no act, because of great prosperity and a greatly increased demand for labor.

Cost of living would likewise have gone up, act or no act, because of the greatly enhanced world price for all agricultural staples and the abnormal advance in city land which materially increased rents. There is some friction between employers and men but not nearly so much as is to be found in countries where strikes and lockouts prevail and cause endless strife and bitterness that leave scars behind for indefinite periods.

The government reports show a diminished efficiency of about twelve per cent in the last several years on the part of the New Zealand workers. If New Zealand was the only country in the world where this condition prevailed it might be laid at the doors of the act. The fact, however, remains that a diminishing efficiency is a universal complaint through Europe and even the United States is not free from this complaint. Hence, this evil can not justly be laid to the act. If there is a cry to "go slow" among the New Zealand workers, it is done quietly and secretly, whereas throughout Europe the cry of diminishing output is shouted, so to speak, from the house tops. Wherever socialism in Europe has made itself felt, and it has achieved this in most all continental industrial countries, where ninety per cent of the organized wage-earners, are members of the Social Democratic party, there you hear the cry sent forth, loud and deep and burnt into the hearts of the workers that it is a crime against labor for the worker to put forth his best. The Socialist proclaims aloud to the wage-earner in those countries that he should practice a diminishing output, first, because it means more work for more hands; secondly, because under the capitalistic system, the worker, at best, gets a small wage, and that a small wage is entitled only to a small return, and finally, because a diminishing output means crippling the profits of capital and thus hastening the day when capital will be wiped out and socialism placed in the saddle. Wherever a diminishing output is met with in New Zealand, it can far more readily be traced to the preachments of such Socialists as have found their way to New Zealand than to any influence of the act.

One of the bitterest opponents and critics of the act is J. MacGregor, M.A. of Dunedin, New Zealand. In a pamphlet published by him in 1902, under the title of "Industrial Arbitration in New Zealand. Is it a Success?" he pronounces the act a dismal failure, and dwells particularly on the point that it makes for a saddening degree of diminishing efficiency on the part of the workers, and he makes a plea therein for voluntary arbitration as being infinitely better in its effects on worker, employer, and community than compulsory arbitration.

Unwittingly, however, he quotes the following illustration of an incident said to have happened in England, where voluntary arbitration is depended on for the settlement of labor disputes and where neither the legal minimum wage nor compulsory arbitration is on the statute books. This incident shows how much greater must be the degree of diminishing efficiency and lessened output in England, despite the absence of the laws Mr. MacGregor complains of, than in New Zealand: "Sir Hiram Maxim gave an instance of a small gun attachment which the labor union committee classified as a day and

a quarter job. He invented a machine to make it, but the men would produce the piece in a day and a quarter even with the machine. He then hired a German workman who easily produced thirteen pieces a day."

I think I have shown conclusively by the figures furnished by the treasury department of New Zealand, that the tax burdens have decreased rather than increased since the act has been created. I hope I have also made it plain, in an earlier part of this report, that if home production has not kept pace with imports it is due to causes other than the creation of the act.

The New Zealand government reports show clearly that capital has had sufficient confidence in New Zealand and its labor legislation to increase its investment industrially in that dominion nearly fifty per cent in the five years from 1901 to 1905, and that private wealth increased from 1896 to 1906 over seventy-eight per cent. The records further show that since the new amendments of 1908 have come into force, men have generally obeyed the awards of the court and that where they have failed to do so, the court has been able to inflict and to enforce penalties.

Unfriendly critics are fearful lest in bad times when wages are cut by the court the men will not yield and strikes will follow. The answer to this contention is that for the past eighteen months New Zealand, in common with the rest of the world, has undergone a period of more or less severe depression that has been keenly felt, industrially and commercially. This is pointed out in the latest report of the Wellington Chamber of Commerce, where attention is called to the fact that in consequence of the financial collapse in the United States in the fall of 1907, the New Zealand exports for the year 1908 declined eighteen per cent. Just enough to take the "velvet" out of profits generally and has brought to New Zealand consequent hard times. Yet despite these hard times the court has not cut wages in any of the industries whose awards in the intervening months have come up for revision, because of the fact that in good times the court has not fixed wages in accordance with the large profits earned by employers, but rather on the basis of the cost of living, and so in bad times it declines to consider diminished profits, but continues to take the cost of living as a basis. Should hard times continue long enough to bring about a material reduction in the cost of living, only then is the court likely to consider the necessity of cutting wages correspondingly. The question remains, when that extreme condition is reached whether the men will submit without resort to strike. My opinion is that the time will never be at hand when it will be possible to guarantee that there will be no strikes in New Zealand or elsewhere. But I venture the opinion that with the

restraining influences created by the revised New Zealand laws of 1908, strikes, even in the hardest times, will be fewer than ever before in that dominion.

Mine was the interesting experience of pointing out to the severest New Zealand critics of the act the fact that they were permitted to enjoy a degree of industrial peace unknown in Europe or America, where workers may legally strike and employers legally lockout, for any cause or for no cause.

Despite the fact that for general intelligence and all round ability the New Zealander will compare favorably with any set of men I have met in all my travels, he did not seem to be well informed on existing industrial conditions in other countries. When these were pointed out to him they seemed a revelation, and out of the scores of those I interviewed, I do not recall one who was finally willing to consent to exchange the industrial conditions of New Zealand under its labor laws with those prevailing in Europe or America.

Many who in the beginning of the interview were most bitter in their denunciation of the act were in the end frank enough to admit that they had condemned it out of their ignorance of the unfortunate industrial conditions existing in the outside world, where the state does not intervene in industrial disputes, and they acknowledged that they had not sufficiently appreciated the industrial advantages that the act had brought with it.

I can not better conclude this report than with the editorial published in the Wellington *Evening Post* of April 15, 1909, dealing with a paper read the preceding day before the Chamber of Commerce in that city by Secretary Broadhead of the Christchurch Employers' Association in which he roundly condemned the act:

Mr. H. Broadhead, secretary of the Canterbury Employers' Association, took rather a gloomy view in the paper which he read to the delegates of Chambers of Commerce yesterday. "Does the Arbitration Act Hinder Industrial Progress?" was the text of the address, and by a course of reasoning, peculiar and very controversial in parts, the speaker arrived at the answer "Yes." The conference thanked him for his thesis, but did not commit itself to any approval or disapproval of the pessimistic doctrine. Practically, the arguments remain the opinions of one delegate, and are consequently robbed of much of their importance. It seems evident that Mr. Broadhead has confused the purpose of the industrial legislation with mistakes and weakness in the administration. We have repeatedly contended, and we repeat that contention now, that notwithstanding recent occurrences, the arbitration law is as good and useful as ever it was. All the disputes and all the strikes are trifling in comparison with the real and lasting good that the law has done during a dozen years in founding and consolidating industry. It was not the act, but the administration of the act, that broke down. Must a good machine be smashed because an engineer does not appreciate the difference between a "governor" and a "crank?" Mr. Broadhead, in effect, suggests a reversion to the old order. We are sure, however, that if the issue was put straight out to the employers of New Zealand an appreciable majority would vote against a retrogression to the régime of the old days before the mind of the Hon. W. P. Reeves saw a way leading towards peace.

The spirit of this legislation is calculated to go for the benefits, not of any one class. but the welfare of New Zealand as a whole. Employers, of course, have approved the theory, but some have complained at the effect of the practice. Yet they must remember that the sorrow which came to them was rather due to the weakness and timidity of the administration than to the law, though the law may not have been perfect.

The amendments enacted by Parliament in 1908 have removed from the act the chief objections pointed out by its critics. Since these amendments have gone into operation, early this year, a much better feeling has prevailed between such employers and workers as have since had occasion to renew their demands or to adjust differences. The industrial peace enjoyed throughout New Zealand during the past year promises now to be the normal condition of the future, with every probability that New Zealand will actually become "a country without strikes."

CONCLUSIONS AND RECOMMENDATIONS.

At this point I desire to express to your Excellency my appreciation for the honor conferred in issuing to me the commission to investigate the labor laws and the labor conditions of foreign countries, and to report to you as the Chief Executive of the State.

The work has been to me in the nature of a rare educational opportunity. It has brought me in touch with many men in many lands whom it was a pleasure and a privilege to meet and whom I wish through this medium to thank for the many courtesies extended and the valuable information so cheerfully furnished.

For obvious reasons I can not give the names of all who rendered me assistance, but I shall ever retain in grateful remembrance the many acts of kindness and the courtesy shown me throughout my long and varied journeyings in quest of information, by men in various walks of life, voicing widely different points of view.

I found that in most countries the labor problem is regarded as one of the great problems of the day. It is commanding the best thought of many of the world's best minds.

Statesmen, great captains of industry, political economists, labor leaders, journalists and humanitarians, the world over are earnestly striving to better the condition of the wage-earner and his dependents and to find a way peacefully to settle the inevitable disputes constantly arising between employers and employees and likely to continue to arise.

That the labor problem is commanding the attention of many of the world's best minds, speaks well for the wage-earner and well for society generally. It is not likely that capital, except in isolated cases, would of its own volition, have shortened hours, increased wages and improved working conditions, and thus at least in its own opinion, lessened profits. It therefore speaks well for organized labor that through its initiative much has been done to bring about these bettered conditions. It speaks well for society generally because, unless the initiative of the worker to better his condition had been aided by statesmen, legislators, political economists, writers, and the more progressive and sympathetic employers backed by an intelligent public sentiment that had largely been educated by organized labor, the great betterment in the condition of the wage-earner which in the last decade or two has taken place, would not have been possible.

Much of the wage-earner's improved condition has been brought about through industrial war. In the beginning, the worker had to battle to command recognition.

For generations the employer had been led to feel that he was the all in all, in industrial matters, that the mere circumstance of his furnishing employment made him labor's benefactor, that it was for him, wholly and solely, to dictate terms and conditions of labor, and for labor gratefully to accept.

The idea of the worker being entitled to a voice in the matter of wages, hours of labor, or conditions of employment, seemed to the employer an impossible thought, and for the worker even to hint at such a right on his part was regarded as a bit of arrogance and a decided impertinence meriting instant dismissal. Conditions, however, have changed. Labor unionism has done much to educate the employer to the fact that the worker is entitled to a voice in all things affecting his own welfare. Trade unionism has through hard fought battles involving at times great industrial wars, with their frightful consequent sufferings to both sides and to society generally, forced upon even the most aristocratic and arrogant among employers the fact that it is a power to be reckoned with.

Providence has not given all the virtues nor all the human weaknesses either to the man who pays or to the man who receives wages. Both being human are likely in common to have the same virtues and the same failings. And so, when the employer believed himself the sole arbiter, he made, as a rule, the most of his opportunities to exploit the worker; when in turn organized labor believed itself to be in the saddle, it followed the example of the employer, and often became just as despotic, just as tyrannical and just as ready to exploit the wage-payer.

So long as industrial wars were petty in character and involved but few combatants, society generally felt little concerned in them, but when the tremendous growth of industrialism in recent decades led to colossal industrial wars that frequently affected the welfare of whole communities and at times of great nations, society, whether it would or no, found itself, as a matter of self-defense, obliged to take the deepest interest in these industrial conflicts with the view of preventing them if possible.

Great and mighty governments that in the past looked upon the manual worker as mere cattle in times of peace and as so much food for the enemy's powder in time of war, have been compelled by his solidarity and his aggressive agitation to devote much thought and attention to the consideration and adjustment of his grievances.

The question then is, have we not reached a stage when industrial war, having served its purpose in commanding for organized labor its just recognition, may be relegated to the dead past? I hold that the time is

here when labor, and capital, may put aside the munitions of industrial war, the strike and the lockout, with their incalculable cost which is forever lost to society. Who will oppose reason and equity taking the place of the brutal strike and the heartless lockout, if, by the recognition of the organization of labor, a way can be found to insure the exercise of reason and equity in the settlement of labor disputes?

I hold that the time is ripe when the suffering and misery brought upon untold numbers of innocent people by strikes and lockouts should cease.

I found that men and governments the world over believe that such a time is here and many among them have been and still are earnestly striving to find a practicable and equitable way of peacefully settling labor disputes, so that the strike, labor's deplorable weapon of offense and defense, and the lockout, capital's equally deplorable weapon, may be safely laid aside.

The first governmental step along these lines was the creation of machinery that would aid and encourage voluntary arbitration on the part of employers and men. Among the countries who legislated along these lines are Great Britain, France, Belgium, The Netherlands, Germany, Austria, Italy, and many of our American states. The results have, however, been insignificant and disappointing.

Here is a summary of the net outcome for some of these countries as shown in Bulletin No. 60, September, 1905, issued by the Bureau of Labor, Washington, D. C.:

Years.	Country.	No. of strikes.	No. of state interventions.	Per-centage.
1896 to 1903.	Great Britain	4,952	154	3.11
1901 to 1904.	Netherlands	529	59	11.15
1902 - 1903.	Germany	2,636	318	12.06
1894 to 1902.	Austria	2,390	573	23.97
1897 to 1899.	Italy	732	16	2.18
1893 to 1903.	France	5,874	1,413	24.05
1896 to 1900.	Belgium	610	35	5.74
		17,723	2,568	14.49

AMERICA.

Years.	State.	No. of strikes.	No. of state interventions.	Per-centage.
1901 to 1904.	Canada	490	33	6.73
1896 to 1900.	New York	6,189	390	6.30
1886 to 1900.	Massachusetts	2,628	563	21.42
1893 to 1900.	Ohio	878	103	11.73
1895 to 1900.	Wisconsin	195	53	27.17
1897 to 1900.	Indiana	183	82	44.80
		10,563	1,224	11.59
	Europe	17,723	2,568	14.49
	Totals	28,286	3,972	14.04

The foregoing figures show that in thirteen European countries and American states where the government had created machinery for the voluntary adjustment of labor disputes such intervention had in the course of years been applied in only 14.04 per cent of cases.

From the only available figures afforded by Bulletin No. 60, from which the foregoing data are taken, to show in how many instances such state intervention occurred before a strike or lockout took place, I take the following figures:

	No. of strikes.	No. of state interventions.	Per-centage.
France	5,874	61	1.04
New York	6,189	32	0.51
Massachusetts	2,628	419	15.93
Ohio	744	13	1.74
Wisconsin	53	6	11.13
Indiana	82	2	2.68
	15,570	533	3.42

It is safe to assume that if the figures of the other countries and states were available, they would show substantially the same average percentage of state interventions before cessation of work. These figures must convince the most pronounced advocate of voluntary arbitration with or without state intervention that it is largely a failure the world over, so far as being a prevention for strikes or lockouts.

It is to be deplored that this is so, since the ideal way of adjusting labor disputes is for both sides to get together voluntarily, in the hope of reaching an understanding. Failing in this, then to submit the dispute to a disinterested arbitrator or arbitrators and accept the decision.

However ideal this plan may be, the world experience shows that it can not be relied upon as a prevention, except in a very trifling percentage of cases, even when the state assumes the task of relieving both parties to an industrial dispute from taking the initiative.

The next logical step for state intervention is the one generally adopted by the Australasian governments, where the state not only compels the disputants to get together but also compels them, if they can not agree between themselves, to abide by the decision rendered by the court. This has led to the colonies enjoying the highest degree of industrial peace the modern industrial world has seen, as evidenced by the following number of strikes which in the last fifteen years have taken place in the three principal industrial governments of Australasia:

Victoria	9
New South Wales	186
New Zealand	25
Total	220

or an average for the three governments of less than fifteen strikes a year. When it is remembered that even this insignificant number of

strikes was largely due not to any weakness in the principle of compulsory state intervention, but to defects in the administration of the law, because of inexperience, the showing is the most remarkable in modern industrial history.

With the perfected laws recently enacted as the result of past experience, the next fifteen years are likely to show a still more remarkable result along the lines of industrial peace.

The Australasian system has proven the most powerful check on the greed of the unfair among employers and the most effective restraint against the selfish and unreasonable demands of the unscrupulous among labor unionists, that the legislative mind has ever devised.

It has protected the worthy wage-earner against his fellow-worker who was *willing* to work for a starvation wage and also against the sweating employer who, if he could, would *compel* him to work for a starvation wage. It has also protected the worker from the hasty and ill-judged action of well-meaning but overzealous or hot-headed labor leaders in precipitating strikes that to the worker and his family might spell ruin and starvation.

It has further protected the wage-earner from the unscrupulous among labor leaders who for selfish reasons might deliberately, to the worker's ruin, bring about unwarranted strikes. It has protected the fair employer from his unfair competitor, who by exploiting labor could underbid and undersell him and in the end compel him likewise to become unfair to labor or go out of business. It has succeeded in maintaining the highest degree of industrial peace known in modern times, for the good of the worker, employer, and the body politic. For all these reasons a fair-minded inquirer must pay the highest tribute to the Australasian statesman in having rendered a great service to his own people and in having at the same time given the world a valuable object lesson in demonstrating the importance and the practicability of state intervention in the settlement of labor disputes.

Given the same conditions, I could not serve my commonwealth better than to recommend to it the adoption of the Australasian system for the settlement of labor disputes and the prevention of sweating. But owing to widely different conditions I do not see my way clear to make such recommendations.

The success of the Australasian labor laws is dependent primarily upon two things:

(*a*) The confidence of employer and worker in the fairness of the industrial court.

(*b*) The compactness of its industrial centers.

The Australasian courts command confidence because their life tenure, subject to good behavior, makes them independent. They are not placed

in a position where to retain office they must favor friends or punish enemies.

In the course of my Australasian investigations I heard many criticisms on the judgment of the courts, but I never heard the slightest whisper, even on the part of the severest critics, that reflected on the honesty or the good intentions of the court.

I believe that the judiciary of California for honesty and integrity will compare favorably with that of any in the land; the fact remains, however, that under the law our courts are elective and being elective this must tend largely to destroy the absolute confidence in the court, so essential in the adjustment of labor disputes. Labor is likely to contend, when decisions are rendered against it, that the court has been swayed or bought up by the power of capital; and capital is likely to feel, when decisions are rendered against it, that the court has been intimidated by labor, or to get votes, has toadied to labor. Such an inevitable attitude on the part of one side or the other or both, must in the end cripple the usefulness of the court and defeat the purpose of the law.

Furthermore, the success of the legal minimum wage and the legal maximum hours of labor, fixed by Australasian courts, having in view the wiping out of sweating, depends largely upon the centralization of industry. In New Zealand the entire dominion is treated as a unit and the one administration can regulate and control every part of the colony. Of the six states of the commonwealth of Australia, five have laws regulating wages and hours of labor; the sixth state, Tasmania, has but small industrial interests.

Our country has nearly fifty States, each with its sovereign and independent right to fix a legal minimum wage and maximum hours of labor. If uniform legislation among all or most all of the States could be enacted it might be possible legally to kill sweating. Otherwise, such legislation would simply mean driving the sweater from one State across the border to some other.

For these reasons I do not see my way clear to recommend to your Excellency the advocacy of the Australasian labor laws in their entirety. In the interest of industrial peace, however, I do earnestly believe in the adoption of the principle of State intervention in labor disputes to the fullest degree consistent with our conditions and with our form of government.

That some state intervention has been deemed essential is shown by the states on our own continent and the various industrial countries of Europe, who in recent years have created legal machinery for the peaceful settlement of labor disputes. That such legal machinery has practically failed is due altogether to the fact that its use was made voluntary in character. For the state to serve any useful purpose in

such sphere of activity, it must go a step farther and follow as nearly as its conditions will permit, the pioneering footsteps of the Australasian colonies. I had practically reached this conclusion many months ago while making my investigations in Europe.

The contact with many of Europe's keenest and ablest minds in all walks of life, who were high authorities on labor problems, had crystallized my thoughts on the question as they never could have been crystallized as a mere student of book-knowledge, or even as a fairly large employer of labor coming in contact with men and conditions and experiences only in my own country.

I soon realized that voluntary arbitration the world over was largely a failure, and for the reasons already named I also realized that compulsory arbitration would not fit the conditions of our commonwealth. My knowledge of conditions generally and my observations in various lands had forced upon me the conclusion that the weak spot in the adjustment of industrial disputes was the fact that, as a rule, the side that believed itself to be the stronger refused to meet or to treat with the other side. If it was labor that believed itself to be the stronger, it was likely to take the position that the employer must concede *all* its demands or none. When capital felt itself to be the stronger, its answer to all appeals for a conference made by labor or by voluntary interveners was to the effect that it was quite satisfied with existing conditions and that there was nothing to arbitrate. And so the struggle would go on, the victory often going, not necessarily to the one that had right and justice on its side, but to the one having the longer purse or the greater endurance, such victory often being bought at a terrific cost to the victor, to say nothing of the disaster to the loser and the injury to the State.

The problem then seemed how to compel the unreasonable, the unfair, and the stubborn on both sides to get together in the hope that by conciliation, and, if need be, by the intervention of a third disinterested party, an agreement might be reached.

It is generally conceded that public opinion is a most important factor in the settlement of labor disputes, more especially when they are of a character likely to affect public convenience or comfort or profit. It is rarely if ever that a strike or a lockout can succeed that has public sentiment against it. The problem, however, has ever been how properly to enlighten public opinion and how to place before it the actual facts involved in a labor dispute as found by a disinterested inquirer in whom the public would have confidence.

With these thoughts in mind it seemed to me that an important stride would be made in the direction of industrial peace, if legislation was created calling for a public inquiry in labor disputes before they had reached the serious stage of strike or lockout.

I realized, however, that any legislation along such lines, in a country such as ours, must at best be experimental. While in that stage I feel that the proposed legislation should be confined to disputes likely to arise in the conduct of public utilities, since it is strikes and lockouts in these activities that, as a rule, more seriously affects the public welfare. Should the proposed legislation after a fair trial prove a success, it would then be in the interest of all concerned to broaden it so that *all* industries might be brought under its influence.

This conclusion having finally been reached on my part, I formulated it on paper while in Brussels, Belgium, in the nature of a rough draft of a proposed law.

On arriving in Paris a few days later I found awaiting me there a packet of printed matter sent me by the Canadian Labor Department through the courtesy of Mr. Dougherty of the Canadian Department of Agriculture, whom some months before I had met while in Rome.

Looking over this printed matter, I was surprised to find that my idea had been anticipated by the Deputy Labor Minister of Canada, McKenzie King, who had recently formulated and had succeeded in getting the Canadian Parliament to pass a public inquiry act. My satisfaction can be understood when I found among other documents in this collection the first annual report just issued by the Canadian Labor Department of the operation of the Act which showed that ninety-seven per cent of the labor disputes submitted to a public inquiry had been amicably adjusted, and that in only three per cent of cases inquired into had there been strikes after an award was made.

Here we have a most striking illustration of the difference in effectiveness between voluntary arbitration and public inquiry. Under VOLUNTARY ARBITRATION, having behind it all the machinery and influence of the State, there are strikes and lockouts in about ninety-seven per cent of cases and peaceful settlement without cessation of work in about three per cent of cases. Under PUBLIC INQUIRY we find the very first year of its trial in Canada, when at best the system could not yet have been perfected, ninety-seven per cent of peaceful settlements without cessation of work and but three per cent of strikes. Whatever doubts or misgivings I may have had as to the desirability or the practicability of the proposed public inquiry law were removed by the showing made by Canada as the result of an actual application of the principle. Surely, if in California we can, through the medium of public inquiry adjust peacefully ninety-seven per cent of labor disputes, we shall have accomplished a most important work and shall have come as near establishing industrial peace as under our system of government is possible.

Sailing from Egypt to India, it was my good fortune to meet Mr.

McKenzie King, the framer of the Canadian public inquiry act, to whom I am indebted for valuable hints and suggestions embodied in the following recommendations, which I have the honor to submit herewith to your Excellency.

A BASIS FOR A PROPOSED LEGISLATIVE ACT TO LESSEN STRIKES AND LOCKOUTS.

Whereas labor can be divided into two distinct classes—

(*a*) That employed in private enterprise.

(*b*) That employed in public utilities—a public utility being understood to be any undertaking patronized by the general public, for which a public franchise has been granted by the state or by the municipality.

And whereas, the general public is much concerned in the continuous and uninterrupted service of said public utilities, and in the event of a strike or lockout, is collectively a greater sufferer than the employees of such public utility and their employers combined; be it therefore

Resolved, that the following legislation be recommended to the law-making power for enactment, with the view of bringing about peaceful settlements of labor disputes arising between employers and employees engaged in said public utilities, in order to prevent strikes and lockouts.

1. It is hereby enacted that any public utility corporation or any corporation or contractors doing contract work for any city, county, or for the State, which shall have had a dispute with their employees which can not be settled *may*, or that shall have decided to lockout its or their employees, *must* before declaring such lockout, furnish the state labor commissioner with a written statement to the effect that it has or they have found it impossible to have a conference with its or their employees or their representatives, or, having had a conference with said employees or their representatives, an agreement has been found impossible. Said statement must also set forth the points of existing differences to be settled and agreed upon. Any body of workmen employed by a public utility corporation, or by any company or contractors doing contract work for any city or county, or for the State, which shall have a dispute with their employers which can not be settled, *may*, or *having* voted to go on a strike, *shall*, before declaring such strike, furnish the state labor commissioner with a written statement to the effect that they have been unable to hold a conference with their employers, or, having had a conference, it has been found impossible to agree. Said statement shall also set forth the points of existing differences to be settled and agreed upon.

2. Immediately on receipt of such notice, the said labor commissioner shall interview the parties to the dispute, separately, or in his discretion, collectively, as mediator and conciliator, with the view of bringing about an agreement between them. Failing in this, within

three days he shall notify both sides to the dispute each to submit to him in writing, within three days, the name of a representative who is or has been engaged in the industry, and who is willing and ready to act on a board of inquiry. These names are to be placed forthwith by the said labor commissioner in the hands of the governor, who shall appoint said nominees.

3. In the event of a failure on the part of either or both parties to the dispute to conform to the above provision within the specified time, the labor commissioner shall notify the governor of such failure, whereupon the governor shall appoint within three days a representative or representatives of his own choice, for said party or parties, who has or have been engaged in the industry.

4. These two representatives of the parties to the dispute shall meet immediately after their appointment, and shall proceed to elect a third party as chairman of said board of inquiry. Having chosen a chairman, such party shall be appointed chairman of the board of inquiry by the governor. In the event of the two representatives being unable to agree upon a third party as chairman within three days, they shall notify the governor to that effect, who shall within three days after such notification himself select and appoint a chairman.

5. Said board of inquiry shall have power to summon the parties to the dispute to appear before it, and in its discretion may talk with each of the parties separately and privately in the hope of finding common ground for agreement, and shall have such other powers in the summoning and examining of witnesses, books, and documents as are vested in the superior courts of the state in the trial of civil cases. The members of the board must, before proceeding to the examination of said books or documents, make oath that any information gained from said books or documents shall be confidential and shall not be used for any purpose other than the inquiry. The board shall endeavor to effect a settlement of the differences between the parties, and if successful, shall in writing report the terms of such settlement to the labor commissioner. Failing to effect such settlement, the board shall draw up a findings or report setting forth what, in the light of the evidence adduced, would in its opinion be a fair and equitable basis of settlement of all the matters in dispute.

6. A certified copy of the findings of the majority of the board, together with a certified copy of the minority report, should there be one, provided that the minority report is signed within forty-eight hours after the majority report is signed, shall be delivered to the state labor commissioner, who in turn shall immediately deliver copies thereof to each of the parties to the dispute.

7. Such findings shall not be binding on either party unless signed by both parties or by their representatives, or the award may be used as a basis for an agreement and may contain such penalties for violation by either party as may be mutually agreed upon. In the event of a settlement being reached between the parties the terms thereof shall not be made public if either party objects to such publication.

8. In the event of the employers declaring a lockout before complying with the foregoing provisions, or prior to the receipt of the findings of the board of inquiry transmitted by the labor commissioner, said employers shall be liable to a fine of $25 for each employee locked out for each day during which said lockout continues, said fine in no event to be less than $1,000. Said fine shall become a lien against the property of said employers and shall be collectible as are other court judgments.

9. In the event of workmen employed by public utility corporations, or by corporations or others doing public or contract work for cities, or counties, or for the State, going out on strike without complying with the foregoing provisions or prior to the receipt of the findings of the board of inquiry transmitted by the labor commissioner, said workmen shall be liable to a fine of $1,000. In the event of said workmen having no common funds, then, and in that event, in lieu of the foregoing penalty, every workman going out on strike shall be liable to a penalty of $25, said fine to be a lien against the property or the wages of said workman anywhere within the State at any time within twelve months and shall be collectible as are other court judgments. Violations of the foregoing provisions to be dealt with summarily by the superior court.

10. Attorneys or any other counsel or advocates are to be barred from taking part in the proceedings before the board of inquiry.

11. The inquiry may, in the discretion of the board, be held in public.

12. At the request of either party to the dispute, the board may be reconvened at any time during the life of the agreement to which there has been mutual assent, to interpret the meaning of any disputed point in said agreement.

13. It shall be unlawful to strike or to lockout until seven days after the board award and the objections thereto of either party have been filed with the labor commissioner. In the event of a strike or a lockout taking place after said seven days the labor commissioner shall on demand furnish to the press and to others copies of the said findings.

I herewith give a statement of reasons which should appeal to capital, to labor, and to the general public, for supporting the creation of the proposed board of public inquiry.

REASONS WHY EMPLOYERS SHOULD FAVOR THE PROPOSED BOARD OF PUBLIC INQUIRY ACT.

1. It will restrain the unfair among labor men from making unfair demands.

2. It will tend to prevent labor from resorting to force to secure unreasonable demands, where labor is unwisely led.

3. It will ward off the tendency to establish compulsory arbitration, which is likely to follow if no other means of relief are afforded the public to protect itself against the loss caused it by what are often reckless and needless strikes and lockouts in connection with public utilities. Compulsory arbitration would mean that a court would fix for the employer wages and conditions of labor.

4. It will tend to ensure continuous service with all that this means in respect to contracts.

5. It will tend to reveal to the owners the efficiency or inefficiency of company officials.

6. It will tend to avert all the evils of a strike.

REASONS WHY LABOR SHOULD FAVOR THE PROPOSED BOARD OF PUBLIC INQUIRY.

1. By diminishing strikes and lockouts it will prevent needless waste of the workers' time, money and energy, and tend to obtain justice for labor without loss of income.

2. It will gain for labor intelligent public sympathy, by affording it an opportunity to present its grievances before a public tribunal whose object it is to get at the facts.

3. It will afford labor the opportunity to make good its oft repeated claim that because of the uniform reasonableness and justice of its demands it courts public investigation.

4. It will tend to prevent prejudgment of the merits of labor disputes on the part of an interested and possibly hostile press.

5. It will compel unfair or unwilling employers who usually take the position that they have nothing to arbitrate, to get together with and to meet their men, and will force them to talk about the merits of the dispute and to listen to the claims of the other side.

6. It will tend to prevent unfair or unreasonable employers from acting in a way which must of necessity mean suffering and loss to other people who are not to blame.

7. When an investigation is made, it will not be possible to keep back anything that is likely to prove helpful to the cause of labor.

8. The many little things that sometimes crop up and cause serious trouble, by an impartial investigation, are likely to be adjusted and settled.

9. Organized labor stands committed to the doctrine that it does not want to strike in order to enforce its demands, if the consideration of them can be attained without recourse to that drastic remedy. A board of inquiry will afford the remedy.

10. Organized labor is not blind to the fact that in every great industrial struggle, in connection especially with public utilities, the public has a large interest as well in the result as in the means adopted to reach that result. The board of inquiry would assure a hearing under the fairest possible conditions and bring out the facts.

11. The creation of a public board of inquiry is calculated to postpone hasty action in the direction of strikes and lockouts and will tend to the settlement of disputes as the result of reason rather than as the result of passion or feeling.

12. It withal will not take away the final right to strike.

REASONS WHY THE GENERAL PUBLIC SHOULD FAVOR THE PROPOSED BOARD OF INQUIRY ACT.

1. In all great strikes, especially in connection with public utilities, the public has more at stake than both the disputants combined.

The board of inquiry will represent the public equally with the other parties in interest, which will thus be given the voice in the matter to which it is entitled.

2. It will make for reason and equity, for law and order taking the place of heat and passion, disorder and violence in the settlement of labor disputes.

3. It will make for labor disputes being peacefully settled before a tribunal without interruption to public service.

4. In the event of either party to a labor dispute refusing to abide by the findings of the board of inquiry, the publication of such findings will present the facts and enable the public intelligently to give its support to the party having right on its side.

5. It will tend to reduce to a minimum strikes and lockouts with their consequent tremendous loss and injury to the public.

I have the honor to subscribe myself,

Respectfully yours,

HARRIS WEINSTOCK,
Special Labor Commissioner.

FOURTEENTH BIENNIAL REPORT

OF THE

Bureau of Labor Statistics

OF THE

STATE OF CALIFORNIA

1909-1910

J. D. MACKENZIE, - - - Commissioner.

F. C. JONES, - - Deputy Commissioner.

SAN FRANCISCO



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*Employed in temporary capacity only in field work and during compilation and tabulation of this Fourteenth Biennial Report.

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LETTER OF TRANSMITTAL.

STATE BUREAU OF LABOR STATISTICS,

SAN FRANCISCO, December 1, 1910.

SIR: I have the honor to submit the Fourteenth Biennial Report of this Bureau.

Respectfully,

J. D. MACKENZIE,

Commissioner.

His Exellency JAMES N. GILLETT,

Governor of California.

ACKNOWLEDGMENT.

The prompt and thorough compliance of the employing public with the requests of the officials and agents of the Bureau of Labor Statistics, during the biennial period covered by this report, has made possible the presentation of a very complete and satisfactory compendium of facts and data. The very few persons who hesitated about giving information composed so small a percentage that the effect was not noticeable. To all of the employing public the Commissioner tenders thanks.

To the official staff of the Commissioner, whose prompt and careful work has given value to the report, he expresses especial thanks, realizing that without their efficient coöperation and loyalty the results attained would have been impossible.

J. D. MACKENZIE,
Commissioner.

REPORT OF COMMISSIONER

FINANCIAL STATEMENT.

For the sixtieth fiscal year ending June 30, 1909, and the sixty-first fiscal year ending June 30, 1910.

Sixtieth Fiscal Year.

Appropriations.

Salary of Commissioner	$3,000 00	
Salary of Deputy Commissioner	1,800 00	
Contingent Fund (appropriation)	4,500 00	
Rent Fund	600 00	
Printing Fund	1,500 00	
Balance from fifty-ninth fiscal year	1,353 75	
Deficiency bill (allowed by legislature of 1909)	1,350 00	
Total amount available		$14,103 75

Disbursements.

Salary of Commissioner	$3,000 00	
Salary of Deputy Commissioner	1,800 00	
Salaries of special agents (Contingent Fund)	3,675 00	
Contingent and traveling expenses—as per bills rendered (Contingent Fund)	2,353 01	
Office rent	600 00	
Printing biennial report, stationery, etc.	2,674 75	
Total disbursements		$14,102 76
Balance (reverting to General State Fund)		$0 99

Sixty-first Fiscal Year.

**Appropriations.*

Salary of Commissioner	$3,000 00	
Contingent Fund (appropriation)	7,500 00	
Rent Fund	1,200 00	
Printing Fund	2,500 00	
*Amount available		$14,200 00

Disbursements.

Salary of Commissioner	$3,000 00	
Salaries of special agents (Contingent Fund)	4,597 25	
Contingent and traveling expenses — as per bills rendered (Contingent Fund)	2,887 95	
Office rent	1,200 00	
Printing, binding, stationery, etc.	2,268 00	
Total disbursements		$13,953 20
Balance (including $232 in Printing Fund)		$246 80

*Not including following salaries fixed by statute, approved February 20, 1909, as follows:

Salary of Deputy Commissioner	$2,400 00
Salary of Assistant Deputy—Los Angeles	2,100 00
Salary of Statistician	2,100 00
Salary of Stenographer	1,200 00

Contingent Fund created as per Statutes of California, 1909, pages 137, 191, 391 (fiscal year ending March 31, 1910):

Receipts	$8,581 00
Disbursements	8,527 07
Balance	$53 93

Special Appropriation for Investigation of the Japanese.

(See Stats. of Cal., 1909, Chap. 134.)

Amount appropriated		$10,000 00
Disbursements for salaries, traveling, and contingent expense	$9,794 75	
Printing schedules, etc.	205 25	
Total disbursements		$10,000 00

REPORT OF THE COMMISSIONER.

SUMMARY.

Through an increased volume of labor and the improved character of accomplishments of the Bureau of Labor Statistics for the biennial period ending with 1910, the foundation has been well laid for further expansion and the continued extension along broader lines of the work contemplated by statutory enactment, thus making for a surer future permanency. The increased appropriation for maintenance in the present over the preceding period has enabled the Commissioner to enlarge his official staff, and increase the facilities for the conduct of the business of the Bureau, and thus to secure greater efficiency, and to materially advance the work beyond the maximum made possible in the period ended with 1908.

By enactments of the Legislature of 1909, certain fees and penalties have been added to the statutory appropriation, thus making the Bureau partially self-supporting. These results have been brought about by the initiative and activity of the Bureau in the preparation of such laws and amendments as have been deemed wise and beneficial: the fees in the form of license money required to be paid by the employment agencies, and the penalties for violations, chiefly of the Child Labor law. All the legislation sought on behalf of the Bureau has, with one exception, which was of a technical character, met with the approval of the Governor.

As outlined in various chapters of the present report, it is the desire and aim to offer still further suggestion and assistance to the Legislature in making such improvements in the present laws as will enhance the usefulness of the Bureau. There are several important laws coming within the jurisdiction and supervision of the Bureau which may be still further improved by amendment or substitution, since their defects and faults have been learned through experience.

By amendment of the organic law creating the Bureau of Labor Statistics, the activities of the special agents and the usefulness of the Bureau have been extended to practically all sections of the State, and thus the opportunities for a more thorough study of the general and specific requirements of the demand for labor have been materially improved. These extended activities have reached new lines of industrial labor in all sections of the State. In line with the provisions of this amendment, a branch office of the Bureau has within the present biennial period been established and placed in practical active operation in the city of Los Angeles. While the law did not specifically authorize

the establishment of a branch office at that particular point, it provided for the appointment and compensation of an Assistant Deputy Commissioner, who was, by the provision of the law, required to reside in the city of Los Angeles. The large population south of the Tehachapi, of which Los Angeles is the commercial and industrial center, necessitated the establishment of such an office, in order that a representative of the Bureau for that section of the State could be within easy communication with the employing public and the laboring classes.

The establishment of a branch office at Los Angeles has enabled the Assistant Deputy to more thoroughly carry on the work, and to assist the main office in the transaction of its executive work in the southern portion of the State, which, under this arrangement, has proven to be highly productive in results. This arrangement was particularly advantageous in prosecuting the Japanese investigation, which began in that territory in May, 1909. During a period of about fifteen months, the special agents occupied the Los Angeles branch headquarters, both in the Japanese investigation and in the gathering of data for the present biennial report. And at the close of the Japanese investigation those special agents employed on the biennial report continued to work out from the Los Angeles office. Thus the Bureau was enabled to accomplish a maximum of work in a minimum of time, and at a much less cost than if the agents had been sent out direct from San Francisco headquarters. And further, it has been possible to investigate many industrial activities at points remote from the larger centers of population and situate at considerable distances from the two official headquarters—San Francisco and Los Angeles.

The present report is arranged in two parts: Part One, the Discursive; Part Two, the Statistical. The discursive text includes chapters on the pertinent topics of Child Labor, Employment Agencies, Social Statistics, Wage Payments, and Private Hospitals; also articles on special industries, including Ports of California, Water Power, Lumber, Metals, and Petroleum. Part Two contains statistics, embracing Industrial, Child Labor, and Social data.

The text of Part One is illustrated with photo-engravings of some of the larger industries described. Although this method of illustrating the text has been adopted in other State reports, it is a new departure by this Bureau, and it is believed that the illustrative feature will more clearly present some of the facts described in the special articles.

This part of the report does not contain all that might have been properly included in the pertinent topics and special industries. Only those subjects have been presented which are at this time of paramount importance, or not otherwise treated by this Bureau. The chapters embracing pertinent topics would have been extended to include the

Oriental phase of the labor situation in its relation to white labor but for the fact that this subject has been thoroughly and comprehensively presented in the special report covering the Japanese investigation, which was required of the Commissioner by act of the Legislature of 1909, and submitted to the Governor in May, 1910. The essential statistical data regarding both Chinese and Japanese have been included in Part Two of this report.

The chapter on Child Labor is somewhat extensive for the reason that this subject presents problems demanding especial consideration, and in this duty the Bureau has spent a great deal of time and care. This chapter contains several suggestions which it is believed would be not only of advantage to the Bureau in controlling and regulating Child Labor, but in improving the welfare of minor children, should the Legislature see fit to act upon such suggestions.

In the chapter on Employment Agencies various subjects concerning that branch of the Bureau's work are presented, and several suggestions offered which may point the way to a further improvement in the conditions of laboring men who have to do with these agencies.

The chapter on Social Statistics also contains legislative suggestions, particularly respecting the law of divorcement.

There are two especial features affecting the interests of laboring men, particularly in the unskilled classes, which may, with beneficial results, be called to the attention of the Legislature: one is the necessity for a specified pay day and character of payment in the employment of all classes of labor, and particularly of those men who are employed temporarily and dismissed without notice; the other is the desirability of abolishing and further prohibiting the maintenance of certain private hospitals, particularly by construction companies engaged in work of temporary character.

The articles on Special Industries would have included the sugar-beet, the raisin, and the deciduous and citrus fruit industries but for the reason that these subjects were so thoroughly treated in the special report of the Japanese investigation; hence, they are not properly a part of this report. There are numerous other industries in California that are creators of demand for labor, both skilled and unskilled, but those which are chiefly a basis of such demand are here presented. In the preparation of future reports it would be advisable to include all important industries. It has been necessary to reduce the articles on Special Industries in this report to a minimum of space, owing to the demand for a large amount of other material, especially of a statistical character. The purpose has been to show the relative importance of these various industries to the development and progress of the State, and to indicate by the narrative of facts and figures of production the

relative positions of these industries one to another, and their combined relations to the whole, in the employment of labor. In all of these five particular and leading industries of the State there is a continuous demand for both skilled and unskilled labor. The majority of the people of California no doubt are aware that in the earlier period of the history of the State gold mining furnished employment for a great many thousand laborers, and that at the present time this industry employs large numbers of men; and for some fifteen years past the petroleum industry has been a source of large demand, particularly for skilled labor. An interesting feature of both metal mining and petroleum operations is that the skilled labor employed is chiefly of American origin. This is especially true in the oil fields, where the drillers are approximately ninety per cent of American birth. The manufacture of lumber employs many thousand men, with a preponderance of unskilled labor, including a large foreign element chiefly composed of non-alien races.

The development of the water power resources of California has directly created a very large demand for both skilled and unskilled labor, employed in the construction of electric and other power plants; and indirectly the ultimate employment of large numbers of highly skilled labor, particularly in the various engineering branches; also the very large augmentation of the population, especially in the farming districts, that must follow mechanical appliance of water for irrigation, and in the industrial centers through advancement of manufactures.

A considerable article is devoted to the ports of California, showing their relation to maritime commerce. Directly and indirectly transportation by water furnishes employment to thousands of men. It may be readily seen that the vast improvements that have been undertaken and are still in progress at the various harbors of the State have given employment to large numbers of workmen, and particularly to that class of skilled labor and builders whose knowledge of construction must be obtained in progressive and practical schools of daily experience. Beside the labor employed directly in the several industries described in these special articles, a considerable proportion of all the labor employed in the State of California owes its employment indirectly to the development of these industries.

The statistical matter presented in Part Two covers a larger field geographically than was presented in the thirteenth biennial report, for the reason that the Bureau has been enabled to extend its work in various parts of the State that could not be reached in the preceding biennial period. Also, most of the charts are improved by extension; that is to say, the data delineated in those charts in the thirteenth report have been reproduced and the data for the two years of the present

biennial period have been added, thus making as complete reference charts as possible for comparative study. The store and factory inspection has been greatly advanced, not only as to the number of stores and factories visited in the larger cities, but by the extension of such inspection work to the smaller towns. These tables and charts are accompanied by deductions in narrative, concise and comprehensive.

While it has not been possible to obtain statistical data on all units in respect to several of the industries, the tables as to hours of labor and wage tendencies are complete; also, the related facts as to labor of adult males and females and minors.

In respect to social statistics, modification of the juvenile court law and the increase of the scope of information have made it impossible for the Bureau to obtain accurate and authentic records of the conviction of all minors under twenty-one years of age, so that the comparative charts can not be extended to all classifications in respect to age of persons convicted, but wherever comparisons have been possible, both as regards adult and juvenile crime and divorcements, the charts have covered the preceding biennial period. The work of store and factory inspection in three of the larger centers of population has been more thoroughly and systematically extended in the present than was possible in the preceding period; and thus a large gain in efficiency in the Bureau's efforts has been attained.

A great gain in results attained by the Bureau in the present biennial period, as compared with the preceding period, is shown both in the number of persons considered and the number of visits made by the special agents. The number of persons considered in the present report, exclusive of employees of steam railroads, labor organizations, and employment agencies, but including farm labor, totals 339,609, while for the period ended with 1908 the number was only 120,000, or an approximate increase of nearly 200 per cent. The visits for the present period approximated 15,000, while for the period of 1908 they numbered only 3,500, showing an increase of more than 300 per cent.

The tables embracing Industrial, Social, Oriental, and Child Labor statistics include data on the following subjects: Sanitation, Ventilation, and Wages, in Stores and Factories; wages and other essential facts in Transportation and Communication enterprises, Mining, Petroleum, Agriculture, Organized Labor, and Selected Industries. The Selected Industries include hotels, canning and packing houses, wineries, beet-sugar factories, light and power plants, water power, lumber, powder, and cement industries. The statistical tables include also misdemeanors, felonies, juvenile crime, divorces, and reports of employment agencies.

The charts embrace various subjects, including Average Fees paid to Employment Agents and the number of persons for whom employment was secured; Convictions for Drunkenness in two of the larger centers of population; Commitments to Penitentiaries, and Divorces.

While the tables and charts are complete, so far as available data has made it possible, the accompanying narrative statements and deductions briefly and concisely set forth the fundamental facts in such manner as to render the study of them more interesting.

PART ONE—DISCURSIVE

CHILD LABOR

The vital factors of a nation's existence and of its moral progress are human. In the economics of nation-building these vital human factors are the girls and boys of the nation, whose moral, physical, and intellectual welfare must be the overwhelming concern of the people. Child labor means intellectual impairment, moral deterioration, and physical destruction. No industry has ever been permanently crippled by excluding children from its active conduct. Inventive genius has always come to the rescue when there is demand for greater economy of operation, and there has ever been found a way to apply better methods and adopt improved machinery.

There is no state in all this Union, irrespective of the character of its industries, where the labor of the child is essential to industrial progress and commercial prosperity; the industry that is builded upon the toil of little children rests upon a foundation untenable and insecure. The industrial progress and commercial prosperity of a nation must be builded upon a basis that guarantees to the child its inherent right to moral and physical protection and intellectual advancement.

Laying the foundation along sane substantial lines, with a view to utilizing to the utmost our human forces, the superstructure of an intelligent and moral policy may with safety be erected and employed with moderation in the direction and guidance of a nation's progress, and the conservation of its intellectual and moral resources. Around such basis, which in a nation already rich in moral and intellectual fiber can result only from a general diffusion of knowledge among the masses, there must grow in the coming years a perfected policy, substantial, efficient, and effective, that will insure to every child a minimum of education and a measure of protection of its physical welfare.

With all our resources and all our encouragements there is no present national policy, no national conscience, in America which uses the authority of the nation to conserve and universalize in our children the efficiency of manhood and womanhood. The intellectual and moral ballast necessary to the constant equipoise of the nation can never be secured by the mere utilizing of national resources. In all history men and women have overcome scarcity of resource and difficulties of situation. Strong, sane peoples have employed slender opportunities and hard situation for the working out of substantial and permanent results.

Unstable and frivolous peoples have been overcome by the very plenitude of material and opportunity. Great peoples have made themselves greater by overcoming difficulties and obstacles of environment.

There will be no awakening of the national conscience to the great need of a national policy meet for the preservation of that efficiency in the child that should develop true manhood and womanhood, until such awakening has been aroused in the individual commonwealth.

In the last United States Educational Report it was shown that less than 13 per cent of all enrolled pupils had passed beyond the fifth grade. And these little children, with many others of ages varying from eight to thirteen years who have never attended school and are wholly unprepared for the battle of life, are to be found in the workshop and the factory. The employers of these children pretend, and their parents assume, that they are alleviating poverty and assisting in the ultimate successful rearing of the children. The labor which they perform is seldom of a character which gives them practical and useful training, but is usually of a kind from which they will flee when they have grown old enough to seek for themselves the labor they would prefer or for which they possess natural adaptability. And these little children go into and out from the factory and workshop without the slightest knowledge of what the great industrial and commercial world may be, wholly lacking in intellectual improvement, without the benefits of moral restraint, and in many cases broken down physically and incapacitated for the performance of any labor that would give them the necessities of subsistence.

In some of the factories, workshops, and packing-houses in California, children of ages varying from nine to thirteen years have been found at labor of the same character as that performed by their parents and other adults, and in many instances necessitating their standing throughout nearly the whole of the day. In some cases, in the vacation time, the parent undertakes to excuse the presence of the child on the ground that there are no other means of looking after its welfare during the working hours. The superintendents and managers of these establishments also make the excuse that the children are not employed by them, and are not paid by them, but are employed and paid by their parents, if paid at all. But the fact remains that the child has accomplished in the day or the week a certain amount of labor that has earned a certain specified sum, and that this sum is actually paid by the employer to the parent, and thus constitutes, although indirectly, a payment by the employer for the services of the child. In other cases, the parent declares that the earnings of the child, especially in vacation time, are necessary to the maintenance of the home; and many of them go further and declare that this necessity reaches also into those periods

when the schools, in obedience to the laws, are demanding the attendance of all children within school age.

There are many large industries that do not require child labor, but undoubtedly when these are fully developed they will be the means of establishing other industries, which, if they do not require, will at least assume to demand the labor of minor children. But once the attention of the people has been directed along the right lines with regard to child labor and the moral, physical, and intellectual training of children, there will have begun that progress toward the preservation of childhood and the preparation for growth into manhood and womanhood which may ultimately save the minor child from the labor that would retard its physical and mental development.

Following along these lines with a pure conscience and a clear realization of the protection that the children of California are entitled to, the people of this State will have solved the problem by the time it has reached the industrial and commercial conditions that obtain in other and older states.

The sentiment in behalf of the children of the State is crystallizing, yet there is still a proneness on the part of the people to condone the violation of the laws that have been enacted for the benefit of the child. There is no doubt that this is due, in a very large measure, to the fact that the social life of the parents whose children are now being improperly and illegally employed is wholly unknown to the people at large; and this in turn is due to the fact that the number of these children so employed is comparatively limited. But there exist isolated cases where children are largely in demand and largely utilized; and while these cases are not generally known to the public, they are very often well known to the community in which they are employed. In a great many instances, the parents of the little children employed in the vacation time are not residents of the town or county or community in which the employment is had. Particularly in the fruit-packing and canning seasons families move from those sections which are not productive of fruits to the orchard and canning sections, to reside temporarily in the vicinity of the labor they can secure. And this being vacation time, the labor performed by the children is considered by their parents as a summer outing that will benefit rather than retard their physical growth. But there are other cases, in cities, where children are sent out by their parents to the stores and workshops for the purpose of adding to the slender income of the family, and in very many instances of this character the child is illegally and improperly detained from school.

The industrial training of the child is as essential as its moral and physical training and intellectual education. It is the duty of the State to provide for such industrial training, and thus to protect minor

children from the evils of child labor. One of the objects of the enforcement of the laws enacted for the benefit of the child should be to aid in constructive measures that will result in the revision of the curricula of the public schools, and their equipment with essential facilities to meet the recognized industrial requirements in that period of the life of the child when it is also making effective strides toward intellectual advancement. In this matter of aiding the children in the way of industrial training California has made advancement, but is still in the preparatory stage. While it is the duty of the State to provide facilities for the industrial training of the child, its first and greater duty in this respect is to protect the minor from the evils of labor in factory and workshop.

It has been said that a factory child passes from the age of eleven or twelve years to the prescribed age of fourteen without due regard to the Gregorian calendar. It may be further stated that the child passes this age without any regard whatever having been given by its parent or its employer to either its physical, moral, or intellectual requirements.

The tendency in most of the states, and to some extent in California, is toward the passage by law-making bodies of laws covering almost every conceivable subject. This is true not only on the part of the State legislatures, but the legislative bodies of the counties and municipalities seem to have the same tendency toward the construction of ordinances covering a multitude of subjects not always possible of proper and adequate enforcement. This tendency has brought about a condition of mental disturbance among the people until they are not in position to properly weigh the more important of these measures, many of which require a great deal too much official red tape to put them into execution.

California, like many other states, has not felt the need of reverting to the old common-law idea of the supremacy in the right to know and control matters that concern the requirements of minor children. In this State that sentiment is due largely to extreme area, and small population in comparison to area. It can not be gainsaid that the people, on the whole, are opposed to child labor. In fact, with the exception of those who are benefited by the employment of children, there is probably no citizen of California who is not opposed to the imposition of improper and illegal labor on the minor children of the State; but instead of making it possible to eliminate the evil or raise the standard, many of the employers of child labor, and many of the parents of these children, are simply perpetuating this social sore.

While comparing favorably with the laws of like purport in the most progressive states, the Child Labor law of California is subject to amendment and improvement as it is tried out in direct application to the

employment of children. The earlier acts have been improved by amendment, and the experience gained by officers of the Bureau can be of material assistance to the Legislature in further improvement by amendment, wherever the application of the law has shown such improvement to be necessary.

The laws of the State affecting various kinds of labor, and subject to enforcement by this Bureau, have been issued in pamphlet form; also the more important ones have been presented in separate form, including the Child Labor law. The full texts of all these laws that were in force prior to the amendments of 1909 were included in the thirteenth report, and are not repeated in the present report. But the following brief digest of the provisions of the Child Labor law is here presented:

The act of 1905, regulating the employment and hours of labor of children, prohibiting the employment of minors under certain ages, and of certain illiterate minors, was so amended in 1909 as to cure the apparent defects and supply certain important features omitted from the original act.

The provision prohibiting the employment of children between the hours of ten o'clock at night and six o'clock in the morning in certain places and establishments was amended to include places of amusement, restaurants, hotels, apartment houses, and the distribution and transmission of merchandise and messages; the periods for which superintendents of schools shall make reports to be filed with the Commissioner being fixed by amendment, and places of amusement were included in the occupations and industries required to have age and schooling certificates on file for minors between fourteen and sixteen years of age.

There also was added a provision that one half of the moneys paid for fines for violation of the provisions of the act, as a result of prosecutions by officers of the Bureau, shall be credited to the contingent fund of the Bureau.

A further and vitally important amendment of 1909 provides that (in the performance of the duty to enforce the provisions of this act, as laid down in the original act,) the Commissioner and his deputies and agents shall have all the powers and authority of sheriffs to make arrests for violations.

While curing defects and delegating new powers to the Commissioner, the absence of the amendments of 1909 did not invalidate the act of 1905, as indicated in two opinions expressed by Justice Shaw of the Supreme Court in decisions rendered in 1906; *Ex parte Spencer* and *Ex parte Weber*. (Reported at pages 332-339, 13th Biennial Report.)

Justice McFarland concurred in the decision of the full bench, but did not concur in certain quotations of precedent, particularly that the presumption of the validity of the statute "continues until the contrary

is shown beyond rational doubt''; that, in the opinion of Justice McFarland, was too strong a statement of the rule.

Being impressed with the logic of Justice McFarland's contention against the presumption of validity continuing until the contrary is shown, and notwithstanding the declaration of Justice Shaw that the omissions cited did not constitute invalidity, this Bureau, through whose initiative the Child Labor law was enacted, determined to seek a cure of the defects. This was partially effected, and the statute strengthened by amendment in 1909.

The law of 1905, with the amendments of 1907–09, recites the following provisions for the regulation of child labor and the enforcement of the statute, here noted briefly in the numerical order of the sections:

No minor under eighteen shall be employed more than nine hours a day, except in cases of necessity as prescribed, and when a different apportionment of the hours may be required; but in no case shall the hours exceed fifty-four in one week.

No minor under sixteen shall be employed between the hours of ten p. m. and six a. m. No child under fourteen shall be employed in certain establishments prescribed, except on permit issued by the juvenile court, the permit to be filed and open to inspection of truant and probation officers, or officers of the Bureau of Labor Statistics; and school attendance officers shall have the right to enter and investigate violations; provided that other than school hours and in regular vacation periods any child may be employed in agriculture and viticulture, does not include packing and canning of fruits. The act provides that no minor under the age of sixteen shall be employed at gainful occupations during school hours, unless able to read English at sight and write English legibly and correctly, or unless a regular attendant at a regularly conducted night school.

Employers of minors under eighteen shall keep posted notice stating the number of hours per day required for such work. Employers shall keep records of minors between fourteen and sixteen at all times open to inspection of the proper officers. Age and schooling certificates shall be approved only by superintendents of schools, or authorized by local trustees; duplicate copy of such certificates shall be filed with the superintendent of the schools, and such certificates must be filed in the places of employment; a penalty is fixed for false issuance of permits. Reports showing the number of age and schooling certificates must be filed by the county school superintendents with the Commissioner of the Bureau of Labor Statistics, together with such other detailed information as the Commissioner may require, during the months of January and July for the six months ending June 25th and ending December 25th. Violations by employers are punishable by fine or imprisonment or both;

moneys collected as fines to be paid into the school fund and the contingent fund of the Bureau of Labor Statistics.

It shall be the duty of the Commissioner of the Bureau of Labor Statistics to enforce the provisions of this act, and he and his deputies and agents shall have power and authority of sheriffs to make arrests.

Until such time as the law may be effectively amended the Bureau will seek to have the authorities in the various school districts, where it is possible, reduce the number of persons permitted to issue age and schooling certificates. The Bureau has also discouraged as much as possible the tendency to issue permits to illiterate minors.

There have been noted many instances where permits were granted to minors when wholly unnecessary; if proper investigation had been made it would have been found that the child was seeking work of its own desire, and that the condition of the family did not necessitate nor require the labor of the child. Lack of care and caution in the issuance of these certificates has a tendency to nullify the effect of the minimum age limit provision, and would, if persisted in, equal in fact the strict enforcement of a law providing for a lower age limit.

There is evident indifference or lack of control on the part of the parents in requiring children to attend school. There is an equal laxity on the part of employers in demanding and filing age and schooling certificates. The parent's desire of having the child employed and the employer's anxiety to secure cheap labor have combined, although in some instances without evident intent, to defraud the child of education and to retard its physical improvement. This condition is, in a measure, due to the fact that some school superintendents or principals, who have the authority to issue these certificates permitting the child to labor, are not careful to see that they are properly and legally prepared.

In some instances children have been permitted to carry home blank certificates and return with them signed, while the law requires that the application for permits must be made direct by the parent in person. Satisfactory evidence of age and educational qualifications should be adduced when these certificates are applied for, and the character of the evidence is such that it gives unlimited power to the issuing officer.

There are three sources, varying in responsibility, of improper and illegal issuance of certificates; these are in the home, in the school, and in the workshop. The avarice or the poverty of the parent, the carelessness of the issuing officer, and the utter disregard of the employer all serve to prevent the adequate enforcement of the law. This can be remedied by the willingness on the part of the parent and issuing officer and the employer to do their whole duty toward the child.

The Bureau has urged upon the school authorities in the issuance of age and schooling certificates that if there is doubt as to the age of the child the benefit of the doubt should be given to the law rather than

to the individual, and that this is especially necessary where persons employing children are unable to present necessary corroborating evidence, and have nothing but the statement of the parent. It is in cases of this kind that extreme caution is necessary; that extreme care should be exercised by employers in all instances where there is doubt, and the child be required to secure the necessary credentials from the school authorities.

The Bureau deems it advisable that the Legislature of 1911 so amend the Child Labor law as to require county superintendents of schools, outside of chartered cities of the first, second, third, and fourth class, to designate in school districts having more than one grammar school the principal of some school as an issuing officer, who alone shall issue and be responsible for the issuance of age and schooling certificates. In all larger municipalities having in their charters provision for a city superintendent, it will be required by such amendment that the superintendent designate some one to act as a supervising officer in the issuing of these certificates.

It has required careful watchfulness on the part of the Bureau of Labor Statistics to enforce this provision of the child labor law, and it has been observed that in periods when the Bureau's entire force was employed in the preparation and issuance of the thirteenth biennial report that there was a very decided diminution in the number of age and schooling certificates issued.

There has been some objection offered in various counties to what is charged as interference of the State with local affairs, but it has been clearly demonstrated by the Bureau of Labor Statistics that the laws affecting labor, whether it be the labor of the child or the adult, may be enforced by the State better than can similar laws by the authorities of the fifty-eight several counties and the hundreds of municipalities. Not this alone commends state intervention, but also the fact that the individual cost to the taxpayer is thus reduced to a minimum. The enforcement of the law protecting the child and its application to the various sections of the State must necessarily be gradual. The intervention of the State in what has seemed to many communities and individuals to be purely local matters is an entirely new feature of the ministerial and executive divisions of the state government. The local authorities in cities and counties look upon this branch of control and regulation as their own business. It is their own business to assist the state government in the proper and adequate enforcement of the law. If left to the fifty-eight political divisions of the State for each to have control of its own part in the enforcement of the child labor law, there would be most likely fifty-eight different ideas or plans put into operation, except that in some counties there would be neither plan nor idea,

nor any considerable effort made to enforce the law if there were no direct State control.

There is to-day great need for continued activity in the enforcement of the child labor law, and intervention by the State in the direction and enforcement of the compulsory education law in the several counties and municipalities, as indicated in the thirteenth report of this Bureau. Indeed, the time is at hand when utmost diligence and activity should be exercised by both the Bureau of Labor Statistics and the school authorities in respect to the strict enforcement of these laws.

It has been disclosed, through investigations made by special agents of this Bureau, that a number of children employed under apparent legal permission are really under age, and are not the actual children for whom such permits were issued. Numerous cases have been found where a permit issued for a child between the ages of fourteen and sixteen years has been used by a child of the same family under fourteen years. This method of substitution lies wholly with the parent. The school officer issuing the permit does so in good faith, satisfied that the child for whom the application is made is of the proper age or is qualified as to education, while the intent of the parent is not to send out the child for whom the application was made, but to send out the younger brother or sister as the case may be. Only careful and intelligent investigation can discover these frauds, and only severe penalty meted to the offender can remedy the evil. The parent who desires to secure the earnings of minor children illegally will find some way to accomplish the desire, unless very carefully watched by the officials whose duty it is under the laws of the State to save these children from the imposition.

In the period covered by this report, as in the preceding biennial period, there have been observed numerous instances of minor children of school age engaged in selling newspapers and matches on the streets of the larger cities, and employed at domestic labor. These cases do not come within the purview of the child labor law, nor under the jurisdiction of the Commissioner of the Bureau of Labor Statistics; they can be controlled only by the strict enforcement of the compulsory education law by the school authorities.

In the amendments to the child labor law by the Legislature of 1909, the general tendency was toward uniformity and a more general application of the laws to the requirements of the child. Wherever there were restrictions as to occupations or industries in which the labor of children is inhibited, the occupations were made uniform in the law. Prior to the amendment of 1909, the original law restricting the hours of labor during the midnight period, from ten p. m. to six a. m., the avocations named did not conform to all of the employments that should be restricted. As the law now stands, in its amended form, these restrictions are uniform throughout.

All child labor laws enacted have resulted from the abuse of children in industrial activities, more especially in manufacturing, and from the demand made upon children for long hours of labor under improper conditions. One of the chief purposes of these laws is the protecting of the physical welfare of minors, by the raising of the age limit at which they are legally allowed to work, and the elimination of nightwork. Another purpose, and a laudable one, is the absolute inhibition of the employment of children in the operation of or in proximity to machinery that is dangerous to life or limb: to save them from industrial injuries, and thus aid in the promotion of their physical welfare.

Along with the passage of these laws, and their application and improvement through amendment, there has been added a feature providing for minimum educational requirements. And this feature is found in most of the child labor laws that have met with the approval of civic societies that are interested in the welfare of the child, and such feature forms a part of the organic laws of the most progressive states. But the adding of the educational feature to laws that have for their purpose the protection of the physical welfare of the child makes them unwieldy and cumbersome, and difficult of enforcement. The necessary ministerial and executive appliances essential to the successful enforcement of the educational part of these laws are far greater than would be necessary for the protection of the physical welfare of the child. In fact, these two features—the physical and the educational—should be absolutely segregated and divorced. Segregation would permit of the simplifying of the process of execution and reducing very largely of official red tape.

By a supplementary act of 1909 the Commissioner of the Bureau of Labor Statistics is directed and empowered to aid in the enforcement of an act, commonly known as the Compulsory Education law of 1903–04, when in its application this law relates to employed children. Upon its passage the compulsory education law requiring minimum education of children was entitled "An act to enforce the educational rights of children and providing penalties for violation of the act"; it was approved March 24, 1903, and amended in 1905 and 1907. This law is such that parents, guardians, and others having control of children between the ages of eight and fourteen years shall be required to send such children to the public schools, except when prevented by sickness, evidenced by a physician's certificate, or when permitted by judicial officers to engage in labor, or when no school is located within two miles of the residence of the child. The penalty for violation of the act is fine or imprisonment, or both. The act provided for the enforcement of the compulsory education law, as vested in the school authorities of the State.

The act of 1909, empowering the Commissioner of this Bureau to aid

in the enforcement of the provisions of the compulsory education law relating to employed children, has been of considerable value in correcting the evils of child labor, and in the placing of children in the public school system; still the compulsory education law, with its various amendments, is not all that it might be, and is susceptible of improvement by present amendment, or by ultimate enactment of a substitute law. It is the opinion of the Commissioner of this Bureau that it would be advisable for the Legislature of the State of California to enact and place in active operation a broad, comprehensive law for the compulsory education of children. In order that such compulsory education law may be safely enacted and properly and efficiently enforced, it would be necessary to amend the present law, or it might require the enactment of an entirely new law. And it should require counties and municipalities, through their police powers, and school districts by the proper officers, to coöperate in its enforcement. In order to successfully carry out the educational features desired, and which have been undertaken by the enactment of the present law providing for compulsory education, the most feasible plan would be the creation by the Legislature of a bureau of compulsory education. Such bureau should be granted entire and supreme control in the exercise, direction, and enforcement of the act. And there should also be a supplemental act providing that the school census be placed under State control, and the duties of the taking of this census be performed by such bureau of compulsory education. There should be exact knowledge on the part of the State, to be secured through such a bureau, of all children born within its confines who have reached the minimum age, as provided in the law as it stands, or as it may be amended; and requiring that such children be placed in some public, private, or parochial school, unless lawfully immune. It may be necessary to carry this law further in order to make it full and effective, by requiring the passage of a supplemental act providing for a complete system of registration. This enactment might require, on the part of the parents, that they register all children coming within the minimum age. This task would not be difficult, as the State possesses the inherent right to take possession of all children, if necessary, in order that they may receive the minimum of education.

The enforcement of a properly constructed compulsory education law would tend automatically to enforce the child labor law, for with complete compulsion in the matter of education the problem of child labor could be more promptly and readily treated, and more efficiently solved. The present child labor law could be safely amended by confining its provisions solely to the protection of the physical welfare of minors.

The full enforcement of the child labor law, as it now stands, would require an excessive appropriation, and the employment of a large staff

of field officers employed solely for this purpose, and then there would not be accomplished all that is desirable and essential. In fact, the Bureau could economically utilize the entire staff in the city of San Francisco alone.

The child is not an essential factor in industrial labor in California, as it is in many of the eastern and central states. The ratio of minors to adults employed in the industries where both classes are utilized is here much lower than in many other states; and it is believed that even with the growth of such industries as could probably utilize child labor, the custom would not attain the same proportions nor so vitally affect the social life of children. Although the problems of child labor are not considered to be of serious character in California and may be readily solved by adequate application of the law, yet there should be no cessation in the rigid enforcement of both the child labor and the compulsory education law.

In the field work, while gathering statistics for the biennial report, the special agents of the Bureau have, in all lines of industry where minors were employed, made careful investigation, and wherever violations of the law were found, they have warned the employer by notification in the form of a printed statement that the establishment had been inspected and that certain violations were found to exist. In this way a large number of violations have been stopped without the necessity of resorting to prosecution in the courts. In numerous cases these violations were apparently the result of ignorance of the law. In other cases, they were careless disregard of the law. In both cases the first offense was not prosecuted, but the offender was warned, and through due notice served a further violation was obviated. The Commissioner has found this policy to be frequently effective. The effort of the Bureau has always been along the line of the least possible resistance, and when the violation of the child labor law may be cured by warning, it has been believed that such policy would prove ultimately more beneficial than legal prosecution.

The same character of work undertaken in the thirteenth biennial period in the matter of prosecution for violation of the child labor law has been carried into the period covered by the present report; and the same general policy of the Bureau toward employers, and minors whose welfare is within the purview of the statutes, as outlined in the thirteenth report, has been continued with diligence and with such improvement in methods as experience has taught to be of avail in the more certain accomplishment of the undertaking. Only in extreme cases has there been invoked the power of the courts in the effort toward remedying the existing evils. In such cases drastic measures were found necessary to induce strict observance of the law by employers, and a proper respect for the ministerial power vested in the Commissioner.

Effort has been made to impress upon the employing public the importance of the child labor law, and the expediency of continuing the policy of strict enforcement of its provisions. The time consumed and the cost incurred, particularly in the prosecutions at points distant from San Francisco, are factors that form a condition to be considered. Also, the Bureau has done all that has been possible to warn the employing public and to disseminate information respecting the provisions and requirements of the law, and to appeal to that high sense of duty toward the minor which should be the concern of every employer of labor.

The school authorities in some counties of the State have aided materially by independent prosecutions. Excellent work is being done by the officers of the juvenile courts in several counties, extreme care and caution being exercised in the matter of issuing working permits to minors under fourteen years of age. In a considerable measure this work has aided materially in the enforcement of the compulsory education law. In some sections of the State steps have been taken and a good beginning made toward enforcing the provisions of the compulsory education law, with encouraging results. In some of the larger cities parental schools are supported, and the nucleus of an excellent system thus developed. Still, in the matter of a proper, adequate, and practical enforcement, no comprehensive plan of action has been formulated.

In some of the larger cities initial steps have been taken along lines that would tend to accomplish the purpose of the compulsory education law; the officer whose duty it is to issue age and schooling certificates, being also designated as director of compulsory education, and having charge of the parental school in addition to the duty of issuing certificates of age and schooling. By thus clothing the officer issuing these certificates with the power of compelling school attendance, the enforcement of the child labor law has been materially assisted, and truancy has been very largely reduced.

With a strict enforcement of compulsory education there would be disclosed two vital conditions in this State—the conditions of dependent and delinquent children—which would form two great problems to be solved by the State through the activity of the juvenile courts and the assistance of such civic societies as are interested and engaged in the welfare of the children. There is a broad difference between the dependent and the delinquent child. The law fully sets forth the distinction. Briefly stated, a dependent child is one who has not received, or is not receiving, that physical and moral protection to which it is entitled, whether the fault lies with the parent or with the State, or with civic or statutory institutions, or with economic and social conditions. A delinquent child, as defined by the law, is one who is deficient morally, the degrees of which deficiency may vary from the commission of minor misdemeanor to incorrigibility, and extend to the commission of felony.

Under the operation of the laws governing and controlling the education and protection of children, the delinquent seems to have the advantage over the dependent, in that it has the opportunity through compulsion to receive at least the minimum of education in the state reform schools or in quasi-public institutions. This seems to be unfair to the dependent child, who has committed no offense and deserves better than it receives. But this is a condition that can be cured only by a strict enforcement of the compulsory education law.

No doubt the full enforcement of an effective compulsory education law would disclose many cases that would require provision for the maintenance and welfare of the child, whether dependent or delinquent, while receiving the minimum amount of education required by the law. Whether in public, private, or parochial school, the proper enforcement of an effective compulsory education law would give the State an opportunity to inculcate in the child respect for law and order, and love of country. And this would be the only opportunity the State would ever have to teach such children these principles.

SOCIOLOGIC

In the gathering and preparation of data concerning social conditions, including misdemeanors, felonies, juvenile offenses, and divorces, the Bureau has followed the same general policy adopted in the preparation of the thirteenth report. While the particular data and general information obtained have been as full and complete as in the preceding biennial period, the data obtained from the county clerks relating to the number of divorces granted, showing the sex of the plaintiff, the date and locale of the marriage, the date of divorcement, and the number, age, and custody of minor children, has not been sufficient for the purpose of as full and thorough study of the direct and contributory causes that lead to the divorce courts as desirable.

So far as the work of the Bureau has to do with this branch of social statistics, it is desirable, and the Commissioner believes it would be advisable, to so amend the statutes relating to divorce that certain additional information might be obtained by the courts, and thus be available for use by the Bureau in the compilation of more valuable statistics. The ages of the plaintiff and defendant at the time of marriage in each divorce case would be valuable, and should be made a part of the presentment in a divorce complaint. This information could be obtained by requiring the plaintiff in an application for divorce to furnish a copy of the marriage license as a part of the original filing. Thus, this particular and valuable information would be a part of the actual records in the case, instead of being a part of the evidence, if used at all. This added information would not only aid the Bureau in determining whether or not there might be any relationship existing between the ages of the persons at the time of divorcement and the length of time they had been married, but it should be valuable information for the courts in determining the merits of a case. Disparity of ages of the plaintiff and defendant at the time of marriage is of more importance in the study of direct and contributory causes of divorce than such disparity at the time of divorcement, dependable, of course, upon the length of time that the persons had been married. These data, added to the information already obtainable, would enable the Commissioner to make a more thorough study of the conditions.

Most of the data furnished in the history of offenders who appear in the juvenile courts are obtained from state reformatories, and from the probation officers in some of the larger cities.

Some of the more important questions set forth in the blank forms sent out by this Bureau are often left unanswered. There is no common method for unity of action by the officers of the juvenile courts in preparing the information. There is necessity for a standardization of this work, and if these officers were required to seek and to record certain important specific information, and forward the same to this Bureau, the Commissioner would be enabled to make a thorough study of the conditions and determine the underlying causes affecting juvenile delinquency. The form used by the Bureau was drawn with the idea and intent of obtaining a complete record of each individual delinquent. There was included in this form a request for the name of the delinquent, which was not wholly necessary, the object being to provide some form of identification, which might have been accomplished for the purpose desired as well by number as by name. All the Bureau desires is some distinguishing mark or number on the record which would correspond with the record in the reform school, or other institution, and which would thus identify the delinquent. The Bureau is not only willing, but desirous to protect the identity of the child, and has held this information confidential, not permitting the names to appear on the tabulated reports or anywhere in the published records. The obtaining of the names has caused some dissatisfaction on the part of the officers, who seem to think that the possession by this Bureau of such information might jeopardize the future of the child. This might be true if the Bureau were disposed, and the law permitted the publication of these names; but as there is no disposition nor permission, the danger is only imaginary. As stated in the chapter on Child Labor, there is a broad difference between the dependent and the delinquent child.

The extension of the work of the juvenile court in the larger centers of population has included cases where the parents seem to be incapable or negligent in properly controlling their children. In some of these cases the probation officers require the minors to report to them. In the work of the Bureau the term delinquent has not extended to this class of cases. The delinquent regarding whom the Bureau has sought information is the child that is brought into court, and whose custody is taken from the parent and given to some recognized and proper civic institution, or to a state reformatory.

The Commissioner considers it important to obtain such data as will aid in determining whether the social conditions in California are wholly or only partially responsible, or not at all responsible, for the position in which the delinquent child has been placed. It is desirable to obtain the percentage of delinquent minors in the juvenile courts who have come to California from other states and the length of time they had been residents of California prior to becoming delinquents. It is further desirable to know under what conditions delinquent minors from other states have come into this State. There are cases of boys

coming into this State in the company of tramps, stealing rides wherever possible on trains, and whose moral condition could in no sense be chargeable to the social conditions of California. Others sent to the state reformatories are found to have been only a few months in California, and had attained to the situation of delinquency in some other state of which they were native or for some time resident. An amendment to the statute providing for the obtaining by the court officers of certain specific information along these lines regarding delinquency cases, would enable the Commissioner to make a more thorough investigation of juvenile crime and a more valuable study of the causes.

In the present biennial report the statistical tables of juvenile offenses and crime are based entirely upon the records of individual commitments to state reformatories, as the returns from other sources were incomplete. The tables are arranged and the data compiled in improved form, presenting the most pertinent facts and tending to show underlying causes. In the matter of divorces, the prior data presented in biennial reports enables a comparison in the present report to be made with the three preceding years.

The Bureau has been unable to continue to the extent desired the study and presentation of certain features in the comparative charts upon the relationship of ages of various persons convicted of felonies and misdemeanors. This is due to the modification of the juvenile court law, which has extended the jurisdiction of that court to include all minors under the age of twenty-one years. So the Bureau has been unable to secure accurate and authentic information and records of the conviction of all minors under twenty-one years of age convicted of felony and misdemeanor. For this reason, an extension of the comparative chart published in this report does not include a comparison of the present biennial period with past periods in respect to these particular convictions.

The sociologic work of the Bureau may and should be extended along lines presented in the statistical tables, and conforming to the various suggestions in this report. This may be accomplished by the utilization of all material available from county and municipal records which might bear directly or indirectly on sociological problems. At present these statistical data cover only felonies, misdemeanors, marriages, and divorces. In the event of the enactment of a comprehensive compulsory education law, this sociologic work may be extended gradually to include certain features of child labor which are not possible under present conditions. A close study of the relation of the ages and other relationships of persons convicted of felony and misdemeanor may in the future be made possible, and thus the sociologic work along that line be gradually and effectually extended. There are many possibilities along these lines which the general conditions preclude from thorough and effective study.

EMPLOYMENT AGENCIES

There has been noticeable advancement in the operation of the Bureau of Labor Statistics and the results obtained in the matter of regulation and control of employment agencies during the two years covered by this biennial report. There is still much to be desired and to be accomplished under the law governing these agencies. The advancement so far made has been the result of amendments to the law, suggested in the thirteenth biennial report, and enacted by the Legislature of 1909 through the initiative of the Bureau, together with the effective and careful work performed by the special agents of the Bureau. The amendment of 1909, granting to officers of the Bureau the power and authority of sheriffs in making arrests for violation of the statute, has been of very great assistance, not only in bringing offenders into court, but in the salutary effect that has resulted from dissemination of knowledge in respect to this amendment among employment agents. The adoption by the Legislature of an act, in accordance with the suggestion of the thirteenth report, requiring the licensing of employment agencies has been of very great assistance to the Bureau in the regulation and control of these agencies. This act was approved March 6, 1909, and provided that every person, firm, corporation, or association conducting or operating an employment agency must procure a license from the Commissioner of the Bureau of Labor Statistics. The application for the license must contain the name of the applicant and the exact location of the agency. In cities of the first, first and one-half, and second classes, employment agents are required by this law to pay a license fee of $50 per annum. In cities of the third and fourth classes the fee is $25 per annum. In all other cities and towns the fee is $6. These licenses authorize the applicant to whom they are issued to conduct or operate an employment agency for a period of one year, beginning with the 31st day of March. The moneys collected for licenses are paid into the state treasury and credited to the contingent fund of the Bureau. It is required by the act that licensed employment agents must procure separate licenses for the operation of branch employment agencies in the same or separate localities; and that no license shall be transferable or used by any agent other than the one to whom it was issued, nor used in a different location than

the one for which it was issued, without the written consent of the Commissioner. These licenses are required to be posted in conspicuous places, and must be exhibited upon demand of any officer or agent of the Bureau. Violation of any of the provisions of this act is described as a misdemeanor; upon conviction of any person, firm, corporation, or association in addition to the penalty provided the license may be revoked by the Commissioner. The provisions of this act do not prevent the collection of any tax or license by any county or municipal authority.

There should be an amendment to the license law of the State which would require all county and municipal tax license officers to furnish the Commissioner of the Bureau of Labor Statistics the names of all applicants for local licenses to maintain and operate employment agencies. By such an amendment the Bureau would be enabled without unnecessary expenditure of time and funds to keep track of agencies that are established, and which may undertake to avoid making application for state license. As the law now stands, the Bureau is put to some delay and expense in securing the names of these applicants before it can ascertain whether or not they have made application for state license. So that it has required nearly a year to secure the necessary information, and to notify employment agencies that were delinquent that it is necessary to take out a state license. This difficulty might be remedied by amendment that should make it mandatory upon applicants, that before either county or municipal license would be granted it would be necessary to first procure a state license. But in spite of the obstacles met with in this and other respects the employment agencies have been brought well under control, and this is due very largely to the provision of section 11 of the license law, granting authority to the Commissioner to revoke licenses because of violation of the law.

The provision of the law respecting the keeping of records by employment agencies should be more definite and specific. This might be accomplished either by the addition of another section, or by a separate act. The purpose of such improvement or amendment in the law would be to prevent collusion between the employment agency and the person making application for laborers. That there has been and still is collusion between the agencies and the representatives of employers is apparent, but it is very difficult to secure evidence sufficient to convict both or either of the parties to the offense. There have been numerous complaints lodged with the Bureau which indicated such collusion or formed circumstantial or record evidence of such collusion or unfair treatment by either the agency or the employer which worked a hardship upon the applicant for labor. These complaints have been thoroughly investigated, and the results have tended to improve general conditions. The effect also of diligence on the part of the Bureau in

investigating the filing of monthly reports has tended to improve the condition. Special investigations by agents of the Bureau have disclosed a number of inaccuracies in filing of these reports, and the results of such investigations have been to cure the irregularity that was found to exist.

It has been found upon careful investigation that many of the complaints against the employment agencies, while brought in all fairness by the applicant for labor, are really unjust, and should be chargeable to the employer or the representative of the employer. The employing public does not seem to realize the position in which the employment agent is placed. Many of the offenses apparently chargeable to the agent are really matters which the agent can not possibly avoid. The employer of unskilled labor usually makes demand for a larger percentage of men than he actually requires, for the reason that he anticipates that a certain percentage of those who accept employment through the agency will fail to report for work. So it has become the custom of superintendents or foremen in charge of large contracts for construction work to place an order for a certain number of men in excess of the actual demand, and if more applicants than he anticipates shall report for work, he has no hesitancy in dismissing all whom he does not require after selecting what he believes to be the best class of the number reporting for work. His main object is to secure enough laborers, and he has no particular care or interest in the welfare of the men who are dismissed. Naturally the applicant for work blames the employment agency, and while his failure to secure the labor he sought works a hardship upon him, it would likewise be a source of hardship if the employment agency were compelled to reimburse him for his expenses, including transportation. This evil is very difficult to cure, and does not come under the head of collusion, although in some cases the suggestion of collusion is apparent.

There is, however, an offense committed by employment agencies which can not be excused on the ground of ignorance. The contractor or subcontractor who has contracted to do a certain amount of contract work in railroad extension, or any work that is being done for a large corporation, will order from the employment agent a certain number of men, giving the order in his own name, and stating the character of the work, the location, and the corporation for whom the work is to be done. The employment agent advertises that the railroad or other corporation, as the case may be, requires a certain number of men for certain contract work at the location named. The men who apply for the opportunity to labor are under the impression that the work is to be done directly for the railroad company or other corporation, and that their subsistence and wages will come direct from the corporation. The fact is, that the corporation has nothing whatever to do with the employment of the

men nor with their subsistence, and the agent has in most cases willfully deceived the applicant for work. In many cases the foreman or subcontractor or contractor may be as safe and dependable a person to work for as though the laborers were paid by the corporation direct, but if the subcontractor or contractor or foreman or superintendent should be inclined to treat the men unfairly, they can not apply to the corporation for whom the contract work is to be done for any redress. This is another evil that is very difficult to remedy, and possibly there is no remedy since the corporation has no particular interest, and would not be likely to undertake the punishment of the employment agent for deceiving men in whom it has no direct concern, since it is dealing directly and only with the contractors.

In the matter of collusion and other unfair treatment of the applicant for labor there has been some improvement in the past year, but the general conditions are practically the same at the close of the present biennial period as were reported in the thirteenth report, for the reason that, as stated, evidence is very difficult to obtain, although the Commissioner may be satisfied that the offense has been committed. Several instances have been observed of men being sent long distances into the interior of the State and employed at unskilled, or partially skilled, labor a sufficient time to earn an amount equal to the advance paid for railroad and stage fare, plus their board bill, hospital fees, the agent's fee, and deductions made for county poll tax. When these men are dismissed they have no balance to their credit, and have merely been given an opportunity to labor for a week or more for their board. But it would be next to impossible to prove collusion or statutory offense in such cases.

The demand for unskilled labor in the first half of the period covered by the fourteenth report was so great that some of the larger employment agencies in San Francisco and elsewhere furnished thousands of men for positions without charging them any fee. This was done by the employment agencies in order to hold the patronage of large employing concerns requiring men for railroad extension and reconstruction, and other work demanding large numbers of unskilled or partially skilled laborers. This condition still obtained outside of San Francisco in the summer and fall of 1910, and in the city of San Francisco during the summer of 1910. And this fact is offered by some persons advocating free state employment agencies as an argument in favor of such establishment.

The Commissioner of the Bureau of Labor Statistics is not inclined to encourage the plan of state agencies until such time as the State shall be prepared to exercise the functions of furnishing employment to unskilled and partially skilled laborers, and conduct such business without competition with privately owned agencies.

In lieu of the present establishment of one or more such state employment agencies in competition with those now paying state licenses, the first step in the right direction would be the introduction of a constitutional amendment contemplating a thorough plan of state control and operation that would provide for the exercise by the State of the functions of furnishing unskilled and partially skilled labor demanded by such urgent industries and construction operations as are conducted directly or indirectly in the interest of development of the resources of the State; and this without competition with the privately owned concerns licensed to furnish that character of employment which the State would not handle. In order to accomplish this, the State must of necessity be empowered by constitutional amendment to assume exclusively the functions of furnishing the particular classes of labor referred to.

In addition to the noncompetitive feature, an unquestioned essential to the successful operation and permanent life of such undertaking must be the provision for a fair, nominal fee to be paid by the successful applicant for labor. It would not only be manifestly unfair to the State that laborers profiting by the operation of such an agency should be so favored without reason, but such a course would result disastrously to the employers of labor and place an unwarranted burden on the taxpayers of the State. No man capable and competent to earn a livelihood should be permitted to obtain any part of remuneration without earning the same. The absolutely free employment agency plan, in competition with privately owned licensed agencies, has been tried out by municipal undertaking in this State. But the plan has not been successful, nor has it operated in direct competition with the licensed agencies of the larger class. The character of employment obtained through a free employment agency is usually temporary and of short duration. The larger corporations that employ large numbers of unskilled laborers are inclined to depend upon the licensed agencies, for the reason that they usually have contracts or agreements by which these agencies undertake to supply their demands at all times. These employers do not take kindly to city or state control in such matters. But if the State were empowered to handle all of the unskilled labor demanded by employers, and privately owned agencies were excluded from this line of work, the opposition would be disposed of, for the reason that the employers would understand that the State was competent to supply the demand.

The establishment and successful operation of an employment agency by the State without competition with the licensed agencies would enable the Labor Commissioner, or the chief of such bureau of employment, to make a thorough study of labor conditions, and to disclose approximately the number of cases of willful idleness. The complaint is gen-

eral that there are large numbers of unskilled and partially skilled laborers without employment who do not honestly and diligently search for it, nor show willingness to continue steadily in such positions when secured. By keeping a careful record of such cases, the Bureau would be able to ascertain the percentage of persons applying for and accepting positions who failed to live up to the terms of the agreement under which they were employed.

The Commissioner or the Bureau would be in closer touch with the needs and demands of various localities, and know just what proportion of unemployed labor in certain districts was available and capable in meeting the demands in other districts, or the general demand. This plan would enable the Bureau to ascertain whether it would be necessary to draw upon the larger centers of population to supply other sections. State agencies, properly conducted and maintained without profit, being practically self-supporting in respect to the incidental expenses of operation, would prove a great benefit to the cause of labor, particularly the unskilled and partially skilled who are under the present system the prey of unprincipled men engaged in the business of furnishing employment. There would be no particular incentive to dishonesty on the part of the employees of the State Bureau or agency, since their compensation like the compensation of other State employees would be in direct payment for their services, and collusion between the employees of such an agency and the employers of labor would be improbable, even if it were successfully possible. The direct benefit to be derived from the establishment and operation of a state agency would be twofold; the laborer would obtain employment at a moderate fee that would not be subjected to demand and supply, and the unworthy element who are disinclined to work steadily would be weeded out.

In addition to the regular reports secured from the various employment agencies, the Bureau has prepared and sent out blanks for special reports on the condition of the labor market for each month. These blanks are sent only to the agencies in San Francisco and other principal centers of the State, and provide a certain class of information, which has been valuable in the study of the conditions of the labor market in both skilled and unskilled labor. These special reports include labor in railroad construction, lumbering, mining, farming, and the general trades and occupations, including blacksmiths, machinists, carpenters, painters, engineers, teamsters, stablemen, gardeners, choremen, porters, waiters, and cooks. The blank was designed primarily for the purpose of furnishing information to the Federal Government and others particularly interested in the condition of labor along the lines mentioned. By this means an intelligent forecast of the demand and supply along these certain particular lines is secured, and knowledge obtained as to whether the supply may be adequate to the demand. This

information deals only with male labor, and no attempt has yet been made to secure such data respecting female labor. The information sought in these blanks includes the prevailing rate of wage, the relative situation of the supply and demand at the time of making the report, and the prospective demand for the ensuing month as compared with the current month. Another feature of the information sought is the name, location, and character of new industrial establishments, or the reopening of former ones, together with the number of men to be employed, and the approximate duration of the employment.

WAGE PAYMENTS

There should be enactment of suitable legislation providing for regular monthly settlement or payment of wage accounts by employers of labor on such certain specified days within the month and upon a date not later than may be fixed by the enactment, and to apply to all classes of labor. In other words, a date limitation for the payment or settlement of wages due for the thirty days next preceding. A reasonable provision should be made for the immediate payment following dismissal of an employee, or at the conclusion of specified employment. Such provision should require that certain prescribed evidence of wages due should be given such employee whose work ceases at a date prior to the regular monthly pay day, and that such evidence may be legally used for negotiable purposes, and further that all wages be paid in legal tender money or in collateral legally and instantly negotiable.

Instances are numerous of the manifest unfairness to employees, which is practiced by some employers, in requiring that the wage earner travel long distances in order to collect the amount due. In many of these cases the employee finds, upon arrival at the point at which payment was expected, that the demand will not be honored until after a lapse of a period of from thirty to ninety days. The complaints that have come to the Bureau disclosing these conditions within the past biennial period would approximate more than a thousand. No official record has been kept of such complaints, for the reason that the Comsioner has no authority to intervene in such matters.

This condition tends to develop a spirit of unrest and dissatisfaction, demanding immediate remedial legislation, which can not be too strongly urged. The numerous cases that have come within the observation of the Bureau show conclusively the hardship that has been worked upon employees, especially the manual labor class, and this applies not only to men who have become dissatisfied with the character and condition of the labor, but to men who have been discharged for valid or invalid reasons. In numerous instances these men have been absolutely refused adequate evidence of the wage earned and due. In fact, instead of some form of collateral payment or acknowledgment, they have in many instances been given simply a brass check or slip of paper issued by the foreman, and the issuance delayed until the pay day fixed at the

option of the employer; and the pay day, or date of recognition of evidence of the wage due, has been, in many cases, extended thirty to sixty days beyond the date when the employee ceased to labor.

These complaints are not confined to any particular locality, but are general throughout those portions of the State employing temporary labor, particularly in construction work.

There should be also enactment of suitable legislation for simplifying the method of procedure in the courts for the collection of certain specified maximum amount of wages due, and giving to the courts ample power in subpœnaing witnesses.

PRIVATE HOSPITALS

The establishment of private hospitals by construction companies, and others engaged in the employment of men in work of a temporary character, has led to many abuses, and, in fact, has become a source of graft. This evil may be quickly and permanently cured by careful and proper legislation. In many cases which have come to the notice of the Commissioner, through complaints of employees, these so-called private hospitals are merely pretensions, and do not serve the real purpose for which they are supposed to be established.

The establishment of these hospitals has carried with it the assumed right to withhold from the wages of the employees so-called hospital fees. The withholding or collection of hospital fees the Commissioner believes should be so regulated by the Legislature and controlled by the Bureau of Labor Statistics, or other proper authority, that the contractors or employers of such labor could by no possibility reap any pecuniary benefit. Such fees as may be legally collected or withheld from the wages of the men might with better results be paid into the county hospital fund in the county where such labor was employed. A provision might be made that the sick or injured employees could be cared for in the county hospital at no further expense to the employee or to the employer than the payment of the fee prescribed by law.

ORGANIZED LABOR

In the effort of the Bureau to obtain full and complete data respecting labor organizations, improved form blanks have been prepared and sent out, and all unions embracing building trades, and other than building trades, have been supplied with these blanks. The result has not been commensurate with the undertaking. The Bureau has utilized all sources available, and sought to obtain through the central organizations or bodies a list of all affiliating unions or locals. The tables presented in the statistical part of this report show the numbers of employed, the percentage of increase or decrease, and the minimum and ruling wage of the building trades unions and affiliating organizations, and also organizations other than building trades, at such points from which the Bureau was able to obtain the information. Had the information received been in full response to the requests sent out, a chart might have been prepared, showing the relation of the present with the past biennial period. But the returns were received from only a small percentum of the organizations to whom blanks were mailed. The data and information available have been utilized to the best possible advantage, and presented in the two series of tables mentioned, which, in addition to the data described, show by location the trade, membership, occupation, and the number of hours of employment per day; wages, showing units, minimum, and ruling wage.



Hop Vines, Sonoma County.



Celery Field, Island Ranch, San Joaquin Basin.



Barley for Shipment, Island Ranch, San Joaquin Basin.



Dredger, Reclamation Work, San Joaquin Basin.



Traction Harvester Engine, San Joaquin Basin.



Lemon Orchard, Ventura County.

FARM LABOR

The situation and condition of farm labor in California are very fully set forth in the special Japanese report, completed in May, 1910. While this investigation was directed to the gathering of statistics and general information regarding the employment of and operations by Japanese in the agricultural sections, it necessarily involved the employment of the white and other races. The investigation covered more than 4,100 farms, and in the statistical reports indicated the number of white men employed, as well as the number of Japanese and other oriental and other races. To make an extended report of the farm labor situation would be merely to review the Japanese report. Every economic relation existing between the oriental and the white farm laborer was investigated by the special agents of the Bureau during that investigation, and the precise conditions have been in the special report very fully set forth.

The value of the products of the soil in California for the year 1909 marketed by the producer, and for the most part shipped out of the State, as shown by the report of the California Development Board, exceeded $305,000,000. This valuation excluded farm animals and animal products, forest products, and minerals.

ORIENTAL SITUATION

In the present report only the Chinese are considered in the tabulated matter respecting oriental labor, for the reason that all phases of life, labor, and activities of the Japanese population in the State were thoroughly covered in the special report of the Commissioner filed with the Governor in May, 1910. This report was the result of an investigation undertaken by direction of the Governor and pursuant to the provisions of chapter 134, statutes of 1909. So the Japanese situation is not included in the present biennial report, except as to the presentation of tabulated data in the chapter on Farm Labor, which shows the Japanese ownership and tenancy.

The situation of the Chinese is practically the same as shown in the thirteenth biennial report. There is no competition between Japanese and Chinese in any branch of labor. The Japanese have confined their energies chiefly to fruit growing in the agricultural districts, and to house-cleaning, and cleaning and dyeing in the cities. While there are still considerable numbers of Chinese employed in fruit growing sections, their employment is not so extensive as to make them live competitors of the Japanese; in house-cleaning, and in the cleaning and dyeing of clothing, the Chinese are not competitors of the Japanese. Even in the housework duties, in which both Chinese and Japanese are employed, they are not competitors, for the reason that the employment of either is merely a matter of preference on the part of the employer. At the close of the biennial season ending October, 1910, there were approximately 40,996 Japanese in the State compared with 45,000 in October, 1908. In respect to the Chinese, the number is approximately the same in the present period and the period two years prior, being 31,100 in October, 1910, and 30,000 in October, 1908.

In making the estimates of oriental population and movement, both as to Japanese and Chinese, the State and United States reports and the records of the transpacific steamship lines were used as a basis. The figure given in 1908, together with the data available from the records of arrivals and departures of orientals at the port of San Francisco for the two fiscal years ending September 30, 1910, form the basis of the Bureau's estimate of the Japanese population. The records of transpacific steamship lines show that the departing Japanese exceeded the



Orange Grove, Southern California.



Orange Grove, Riverside County.



Raisin Grape Vineyard, Fresno County.



Wine Grape Vineyard, Sonoma County.





Olive Tree, Los Angeles County.



Olive Orchard, Southern California.

arrivals for the year ending September 30, 1909, by 2,164. For the year ending September 30, 1910, the departures exceeded the arrivals by 1,840. The net decrease for the two fiscal years was 4,004. The two fiscal years ending September 30, 1908, show a net decrease of 1,213 during that period through the port of San Francisco. The interstate movement of Japanese is not deemed an essential factor in estimating the oriental population. The number moving from California into other states has been practically balanced by the number moving from other states into California. There have been no available data as to the number of Japanese that moved illegally into the United States over the Mexican border. In the first half of the biennial period covered by the thirteenth report of this Bureau—that is to say, for the year ending September 30, 1907—the arrivals of Japanese exceeded the departures by 3,719. In the second half of the fiscal year ending September 30, 1908, the exodus of Japanese began, and during this second half of the biennial period the departures exceeded the arrivals by 2,506. This migration, which has been principally to Japan, has continued during the past two years or biennial period covered by the present report. Within the last half of this period the migration has slightly decreased.

The twelfth biennial report of this Bureau showed the number of Chinese in California in October, 1904, to be 40,000. In the ensuing period of four years ending September 30, 1908, the departing Chinese exceeded the arrivals at the port of San Francisco by 10,255. The thirteenth report of the Bureau placed the Chinese population in October, 1908, at slightly less than 30,000. The steady decrease in the Chinese population during the four years ending September, 1908, ceased in the following year, and in the fiscal year ending September 30, 1909, the arrivals exceeded the departures by 1,659. In the following year, or the latter half of the present biennial period, the position was changed by an excess of arrivals over departures, numbering 538, the actual result being a net increase for the two years ending October, 1910, of 1,121. The Chinese quarter in San Francisco has been practically rebuilt, and the present population is nearly equal to that prior to the fire of 1906, approximately 31,000. Improvement in appearance, substantiality and permanency of architecture, with due regard to ventilation and sanitation, have been observed, and in the past two years the Chinese quarter has been improved by numerous fine structures.

PORTS OF CALIFORNIA

California presents about 1,000 miles of shore line on the Pacific Ocean, extending from San Diego in the south to Crescent City in the north. San Diego, situated at the extreme southern limit of California coastwise navigation, is the first port of call on the Pacific coast north of the Panama Canal and the Tehuantepec railroad. Eureka, on Humboldt Bay, is the northmost port of call on the California-Pacific coast. The mean overland distance from San Diego to Eureka in a direct line is 685 miles north, 35 degrees west; following the water line and putting in at the deep harbors ships travel an approximate distance of more than 1,000 miles.

The principal harbors of sufficient area to accommodate ocean-going ships are San Diego Bay, San Pedro Bay, the bay of San Francisco, and Humboldt Bay; all of which, with the exception of San Pedro, are what is termed land-locked, and at each port there are railroad facilities for interior distribution. At San Francisco, Oakland, and Los Angeles three transcontinental lines have their termini; and San Diego one, and another under construction.

The transcontinental lines terminating at Oakland and San Francisco are the Southern Pacific, the Santa Fe, and the Western Pacific. These lines reach San Francisco by transshipment across the bay from Oakland. The Southern Pacific has transcontinental connection direct by rail across the southern arm of the bay by bridge at Dumbarton Point. At Los Angeles the Southern Pacific, the Santa Fe, and the Salt Lake road have their termini. San Diego has railroad connection at the present time only with the Santa Fe, while a transcontinental line is under way via Yuma, Arizona, direct to San Diego. Eureka has no direct and complete rail connection, but is connected with the North Western Pacific by about one hundred miles of staging. This gap is to be built by that line and thus give Eureka a direct outlet to the interior of the State and with transcontinental traffic.

The principal ports of commercial movement and industrial activity between San Diego and Eureka are Port Los Angeles on San Pedro Bay; Ventura and Santa Barbara on Santa Barbara channel; Port Harford on the bay of San Luis Obispo; Monterey and Santa Cruz on the bay of Monterey; San Francisco, Oakland, Point Richmond, on San Francisco

Bay; Vallejo, Mare Island, on San Pablo Bay; Fort Ross on the Sonoma County coast; Point Arena, Mendocino, and Fort Bragg on the Mendocino coast.

The coastwise traffic of the State extends one hundred miles north of Eureka to Crescent City in Del Norte County.

On this more than 1,000 miles of Pacific shore line, from San Diego in the south to Crescent City in the north, there is transacted a commerce equal to 30,000,000 tons annually.

This volume of water commerce is increasing and will be very largely augmented by the traffic that will come through the Panama Canal, and although California is abreast of the times in the matter of facilities for the handling of such increased volume of commerce, preparations are being made at the principal ports in anticipation of a still greater increase that must follow after the operation of the Panama Canal has become established. These improvements are being made at San Francisco, Los Angeles, San Diego, and Eureka. The water front and appurtenances of San Francisco, and a portion of the San Diego water front, are owned and controlled by the State. Eureka harbor is controlled and regulated by a state board and harbormaster.

The harbor of San Francisco has received no assistance from the Federal Government except the removal of topographical obstructions. The Oakland harbor has been aided by the Government in the deepening of the estuary and the construction of bridges. The harbor of San Diego has received Federal aid in the dredging of the channel. What is now Port Los Angeles, and including Wilmington and San Pedro, has received Federal aid in the construction of a substantial and effective breakwater, forming the outer harbor of San Pedro Bay. The harbor at Eureka in Humboldt Bay has been improved by the Government in the construction of jetties. Further and substantial Federal improvements are required at San Diego, Los Angeles, Eureka, and Oakland. The cities of Oakland, Los Angeles, and San Diego have taken it upon themselves to provide necessary funds for certain essential water front improvements at those ports. Oakland has voted for a probable issue of $10,000,000 of bonds, the first installment to be $2,500,000. Los Angeles, with the consolidated towns of Wilmington and San Pedro, has voted $10,000,000 in bonds, with an actual present demand for $3,000,000; San Diego will spend about $6,000,000 to complete the work planned by the municipality.

No state in the Union can reap larger or more profitable commercial and industrial benefits from the successful completion of the Panama Canal than California. None will offer more numerous and remunerative inducements to labor, both skilled and unskilled, when such commercial improvement and industrial advancement shall become established.

California now produces and ships beyond its geographical boundaries a greater number of pounds of freight per capita than does any other state. A considerable proportion of the nonperishable commercial and industrial products shipped from and into California may be moved by water through the Panama Canal with economy of time and cost, and these economic results should obtain without diminution in the earnings of the railroads, for the reason that a considerable proportion of the increased shipments of essential products that may pass through the canal must be moved to interior destinations by rail.

The Panama Canal will, according to the official announcement of the United States engineers in charge, be completed and opened for the passage of ships within five years.

San Francisco Harbor.

The commercial and industrial water front of San Francisco is State property, controlled by a Board of Commissioners, consisting of three members appointed by the Governor. The initial provision for the establishment of this Board was made by the Legislature in 1853. The Harbor Commissioners have jurisdiction which is confined to state property along the water front of the city and county of San Francisco, which extends from the eastern end of the Presidio reservation, on the north shore, in an easterly and southeasterly and southwesterly direction to the boundary line between San Francisco and San Mateo counties. The Board maintains open fairways in the bay for the clear passage of transbay ferryboats. This water front property consists of all the piers and wharves in the city and county of San Francisco, with the exception of those belonging to the Federal Government, and two manufacturing plants; also the seawall and seawall lots, and certain water front streets, including East street for its entire length. These lots and streets were created by reclamation of tidelands. The Board has no jurisdiction over the ports of Oakland, Point Richmond, Port Costa, or other bay points.

The first permanent bulkhead or seawall was planned and undertaken in 1873, to extend from Howard to Union street, a distance of 3,252 feet. Five years later an extension of this seawall, from Kearny street westerly for a distance of 2,000 feet was undertaken. The completion of these contracts marked the commencement of the permanent wharfing system of San Francisco. Other sections followed, resulting in an aggregate length of seawall at the end of the fiscal year 1908 of 10,800 feet. The biennial report of the Commissioners for 1910 states that the completed seawall on June 30, 1910, measured 11,700.5 feet, and included 30 piers and 23 seawall lots; these, together with the property around the Central basin on the east shore of the southern part of the city, comprise a total of 1,104,275 square feet. The berth



Shipping Scene, San Francisco, South of Ferry Building.

space afforded by the piers and bulkhead wharves aggregates about five miles. The water front line under the jurisdiction of the Board is approximately eight miles in length. The last contract for work under the seawall bonds will add three more seawall lots, with a valuation of over $700,000.

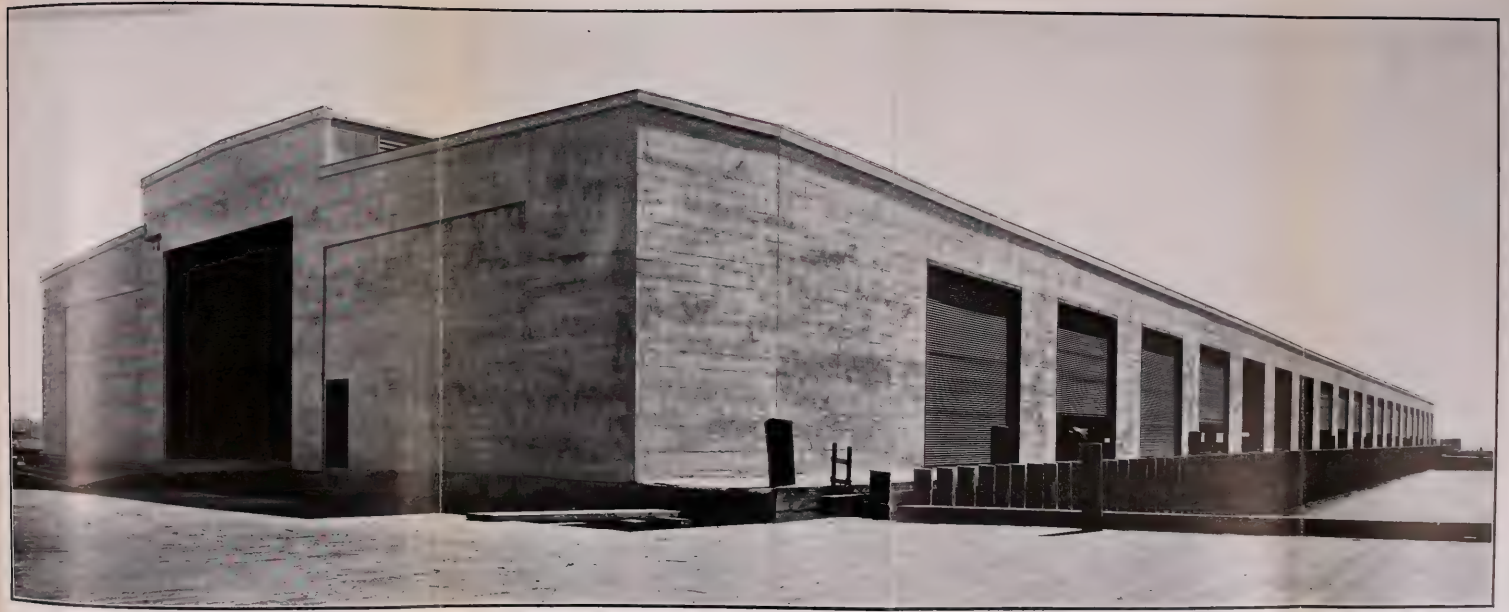
The $9,950,000 bond issue authorized by the Legislature contemplates continued improvement and expansion, which would make San Francisco a capable seaport, possessing ample docking facilities and other requisites for the accommodation of great ocean-going ships, such as would employ the Panama Canal in freight and passenger traffic between the Atlantic seaboard and the Pacific coast, and also any increase in numbers, tonnage, and type of ships engaged in the transpacific traffic.

The possible expansion by continued improvement and development of the water front for the entire length, from Taylor street on the north shore of the City to the San Mateo County line on the southeast shore of the city and county of San Francisco, would provide a combined contour length of piers and bulkheads of 35 to 45 miles. Such expansion would contemplate 800-foot piers, from 140 to 210 feet wide, with water-spaces between piers from 220 to 250 feet wide. A considerable proportion of such development could be accomplished, along with other improvements, by the expenditure of the $9,950,000 authorized by the bond issue.

In addition to the general improvements contemplated by the larger bond issue, the special harbor committee that was created by the Legislature of 1909 to investigate all the harbors of the State with a view to making provision for increasing water commerce recommended, among other things, the purchase of sixty-three blocks of submerged lands adjoining Islais Creek near the south end of the harbor for the purpose of improvement on State account; the exact value of the land to be acquired by appraisement or condemnation being unknown, the amount of the bond was placed at $1,000,000, with a provision that so much thereof as might be necessary should be applied to the purchase of the property. This is known as the India Basin bond issue, and the lands to be acquired are of essential value in the extension of the seawall and the completion of contemplated docks and piers. India Basin comprises an indenture of the bay, lying between Hunters' Point and Potrero Point, and south of and adjoining Islais Creek channel. The acquisition by the State of these lands will largely increase the facilities for dockage and storage, and more especially the accommodation of large lumber interests, and will give the State control of a large body of land fronting on the water front, and which will, in fact, cost the taxpayers of the State no increase in their taxable assessments. Besides the extension of the seawall and the purchase of the submerged lands on Islais Creek, this bond issue includes the extension of the

Belt railroad from the central wholesale district of the city to the south. Since the bridge at Dumbarton Point has been constructed and opened for traffic a large proportion of the through freight by rail comes direct to the south end of the city, where it may be distributed to the Belt railroad, thus making a complete and economic connection between the receiving depot in the south end of the city and the wholesale houses in the business center.

The economic advantage of state ownership and control of harbor facilities and water front property is manifested in the practical and substantial character of the many and continued improvements that have been accomplished and undertaken by the several boards of State Harbor Commissioners of San Francisco, particularly within the past fifteen years. These improvements include the present Ferry Building, a structure three stories in height and 600 feet in length, constructed of California sandstone, and adapted to the passenger traffic of six trans-bay ferry systems and several river transportation companies, besides offices occupied by some of the ministerial bureaus of the state government; and the best modern type of seawall, wharves, and piers. The initial improvement began with the substitution of solid concrete for loose rock construction of the seawall, and of bulkhead wharves; then followed the displacement of wooden piles with concrete cylinder pillars for pier foundations; then the improvement of the superstructure of the piers by the construction of new steel framework. The whole structure is completed with monolithic floors, walls and roof of reinforced concrete, in substitution for the old wooden docks. Thus was initiated a type of construction to be permanently established, and of such character as to secure a reduction of repair costs and insure positive immunity from fire loss, and in all respects conform absolutely to the most exacting quarantine regulations; and which has attracted the commendation of the Federal Government. The seawall has been and is being extended from the Ferry Building south toward Channel street as rapidly as permissible, and new seawall lots created. The later bulkhead wharf construction has been entirely of concrete and steel. Upon completion of the work of this character now in progress there will be a continuous line of concrete and steel bulkhead wharves of more than 3,000 linear feet. This construction lies south of Harrison street, with the exception of 425 feet situate just north of the Ferry Building. This extends to the Washingon street pier and forms an approach thereto. The buildings are two stories in height, and contain offices for the vessels that dock there; they are all of reinforced concrete, and are sanitary and fireproof. The numerous improvements include also the extension of the Belt railroad to all sections of East street, protected by seawall, and is provided with thorough equipment connecting the wharves and



TYPE OF REINFORCED CONCRETE SHED—PIER 40, SAN FRANCISCO

docks. The thorough paving with basalt blocks of East street and other streets under jurisdiction of the State, and other apparently minor conveniences, are included among the improvements. The character of the carrier employed in water transportation at the present time is entirely different from that of a few years ago, when a great deal of the carrying was done in sailing vessels, which made the run on no set schedule. The vessels of the present day are principally large steamers of from 6,000 to 12,000 tons cargo, running on fixed schedule. They are required to occupy as short a time as possible in port on account of the large expense of operation. To meet the demands of this character of ocean-going vessels much of the substantial improvements at San Francisco harbor have been made; and the policy of the State is to continue such improvement, and meet the demands of not only the present, but future water commerce. The proposed extension of the Belt line railroad is amply warranted by the results of its operation, and the very large benefit to shippers and merchants who employ it. The receipts from the operation of the road are shown to exceed the expenditures, making it clear that the road is not an expense, but a source of earning which is approximately sufficient to meet the cost of necessary extension.

By reason of ownership and control of harbor facilities San Francisco has become in a physical sense one of the most important of the ports of the world. San Francisco harbor is second in area only to that of Rio de Janeiro, to which it is similar in geography and topography. In the volume of commerce moved by water this port has attained a comparatively high standing, not only in America, but with European seaports, considering the position this city occupies in respect to active industrial and commercial life compared with older American and European ports. There is no seaport in the world that has kept so well abreast of increased demands of water transportation as has San Francisco.

There are two events close at hand of vast importance to the Pacific coast that must depend largely for success on the harbor facilities of San Francisco. There is no seaport on the lower eastern, southern, or western coast of the United States which has harbor area and physical facilities that can equal San Francisco in the handling of an event like the Panama-Pacific Exposition, which it has been conceded should take the form of a marine celebration. There is no harbor on the Pacific coast of great area possessing physical and structural features equal to San Francisco for the purpose of handling the increased traffic by water that must, in the natural growth of such transportation, result from the completion of the Panama Canal. In respect to these two events, San Francisco is fully competent to handle them successfully and with honor to the city, to the State, and to the entire coast. The positive and substantial work accomplished by the former and present

State Boards of Harbor Commissioners, supported by the liberal policy of the people of the State since the initial undertaking, has made this competent harbor possible.

San Francisco Bay and its northern extension, San Pablo Bay, cover a combined area of 420 square miles. The shore line measures 100 miles in length. San Francisco Bay proper covers an area of 250 square miles, of which 24 square miles are in the immediate vicinity of the city of San Francisco; 14 square miles of this area are used as anchorage ground, and 7 square miles as fairways for transbay ferries.

The fairways in their geographical order, reading from the Presidio to the drydock wharves south of Central Basin, are here briefly described: (*a*) Beginning with the Fulton Iron Works and extending to Fort Point, along the Presidio shore, thence across Golden Gate; (*b*) then to Sausalito Cove, thence to Angel Island; (*c*) from Angel Island to the north seawall at San Francisco; (*d*) from Lombard street wharf and Jackson street wharf to Point Richmond; (*e*) from Washington street and Mission street wharves to Yerba Buena Island, from Yerba Buena Island to the westerly shore of Oakland; (*f*) from the Berry street wharf and the drydock wharves to the southerly shore of Oakland.

Golden Gate Strait, which is the entrance to San Francisco Bay, is about three miles in length and nearly one mile in width at its narrowest point. The maximum depth is 360 feet. Outside the entrance and about six miles distant there is a depth of 33 feet at low tide on the bar. The northern or Bonita channel has a width of about one third of a mile and a depth of 54 feet. The deepest draft ships will always be able to enter this port with safety.

The Sacramento and San Joaquin rivers flow into the bay, the Sacramento from the north, the San Joaquin from the south. They have their entrance at the eastern end of Suisun Bay, which is connected with San Pablo Bay by the Carquinez Strait. The Sacramento is navigable throughout the year for a distance northerly of 262 miles, the terminal point of navigation being Red Bluff in Tehama County. The San Joaquin is navigable throughout the year to Stockton, a distance of 40 miles southeasterly from the confluence of the river with Suisun Bay; occasionally, in the high-water seasons, the San Joaquin is navigable for a further distance of 100 miles southeasterly to the town of Firebaughs. These two rivers drain the great central valley north and south, and carry annually about one million tons of commerce. There are also small tributaries of the Sacramento and San Joaquin which are navigable.

The cities and towns other than San Francisco located on San Francisco Bay are: Oakland, Berkeley, Alameda, South San Francisco, San Mateo, Redwood City, Palo Alto, Newark, Alvarado, Hayward, San

Lorenzo, San Leandro, Fruitvale, Piedmont, Richmond, San Rafael, Tiburon, Belvedere, and Sausalito.

The commerce handled at the state wharves at San Francisco by no means represents the entire commercial activity of water transportation in this harbor. Oakland and other ports do a large share of the commercial traffic by water; the features of such additional traffic are considered in another part of this report.

In the fiscal year ended June 30, 1909, the net tons of freight handled over the state wharves at San Francisco amounted to 6,325,000. In the fiscal year ended June 30, 1910, it had increase to 6,866,000 tons, or about 8.5 per cent. The principal articles were lumber, mineral oil, and general merchandise. The daily average movement of freight over these wharves, in round numbers, for the year 1909–10 was 1,000,000 feet, board measure, of soft wood lumber, 12,000 feet, board measure, hard wood lumber, more than 10,000 tons of general merchandise, 1,000 barrels of wine, 2,250 tons of oil, and 1,200 tons of coal.

The revenue derived from this handling of freight over the state wharves at San Francisco and the rental derived from seawall lots and wharves are applied to the payment of principal and interest on the bonds and to the expenses of operation. In the forty-seven years, from 1862 to 1910 inclusive, the average ratio of administration expenses and revenue was 21.38 per cent; for 1908–09 it was 20.47 per cent, and for 1909–10, 18.25 per cent. With the exception of $100,000 appropriated by the Legislature for urgent repairs necessitated by the earthquake and fire of 1906, the state wharves have not cost the taxpayers any outlay. The seawall lots which have already been created have been let at a good rental, and many of them for long periods. Provision is made for a regular increase in rent every five years to conform with the future increase of valuations of the city, and with the growth of harbor traffic.

So the state properties along the water front are wholly self-supporting; the expenses are borne by those who use the wharves and seawall lots and other conveniences. The regular normal revenue of the Board is derived from dockage charges, tolls on freight, wharf charges, rental of seawall lots, and wharves and offices and other quarters in the Union depot and Ferry building; also switching charges by the Belt railroad. With the addition of new seawall lots as the seawall is increased in length, the rental will be greatly increased.

A comparison of port charges at San Francisco, Liverpool, Hamburg, and London shows that San Francisco has the lowest rate of the four ports named, being $.592 per ton. Hamburg, $.626; Liverpool, $.66, and London $.667. There are two European ports, Rotterdam and Antwerp, which have a lower rate. The above comparison of rates was

made upon steamers of more than 9,000 tons gross, and 5,146 tons net, ladened with grain, lumber, and general merchandise. Comparison of San Francisco, London, Liverpool, and Hamburg on steamers of 3,388 tons gross, 2,202 tons net, ladened with grain, lumber, and general merchandise showed a rate of $.577 a ton at San Francisco, $.576 at Liverpool, $.67 at Hamburg, and $.733 at London. Rotterdam and Bremerhaven showed lower rates than San Francisco.

Oakland Harbor.

Oakland water front extends northerly along the west shore of the city, from the United States training wall to Emeryville. Emeryville is a suburb which lies in a northwesterly part of the city. This harbor is partly occupied by the piers and docks of three railroads. Extending easterly in a line with the United States training wall the city has also a water frontage along the estuary, which extends from the bay along the south shore of the city for a distance of about one and three fourths miles. This estuary divides Oakland and Alameda, but at the westerly end both sides are in Oakland territory. There are wharves on both sides of the estuary, numbering a total of 37. These are all private wharves, with one exception; it is a city wharf for which an individual pays rental. These wharves are occupied by manufacturers, lumber companies, brick companies, engineering works, and cotton mills; there are also two transportation companies with wharves on the estuary.

In the west shore harbor there are, including the extension southerly to Alameda, four ferry piers or moles, and two freight piers. The city of Oakland owns about 900 feet of water front, extending from the ferry pier that lies next to the training wall, and running northerly to another ferry pier. A franchise was granted by the city of Oakland in 1910 allowing 350 feet lying north of the city water front to one of the railroad companies; one of the considerations for this franchise is the agreement to cut what is known as the Long Freight Wharf back to the wharfing outline to which the other piers extend. North of this long wharf there is a frontage of about 9,600 feet, extending northerly to the northernmost ferry pier. Permission has been recently granted by the War Department to the city of Oakland to extend the present bulkhead line from a point 2,400 feet west of the shore line to a distance of 2,000 feet further westward into the bay; also, an application is to be made by transportation interests to the city of Oakland for wharfing-out privileges on this water front. This application calls for 1,500 feet along the shore, and adjoining that the city will have wharfing space of another 1,500 feet.

The northernmost ferry pier, which extends from Emeryville in a westerly direction about 16,800 feet into the bay, is widening its pier ground by filling in on the north side, and will also make application to



WEST SHORE, AND TRANSBAY FERRY SERVICE, OAKLAND

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Shipping Scene, Port Los Angeles.

the city for filling in and extending the south side of the pier, making it full width, thus forming a mole of 1,000 feet wide, as far out as the extended bulkhead line, a distance of about 4,400 feet.

The appropriation by the United States Government for building training walls and dredging the estuary has amounted to $1,750,000; this does not include the running appropriation. There is now a contingent appropriation of $1,500,000, $500,000 of which is at present available. The city contemplates improvements of 2,900 feet on the estuary and 500 feet on the west shore, to cost approximately $2,500,000.

The three transcontinental railroads have their land termini at Oakland, and the large proportion of the freight traffic is transported in cars by car ferry service to San Francisco. Besides this, there is a large local traffic from the interior of the State that finds its way across the bay, by the same method. The figures covering the entire freight shipments into and out of Oakland are not available, for the reason that a great deal of this traffic, as here stated, forms a part of the movement by car ferry service on the bay. The tonnage handled by the wharves in the estuary in the past year amounted to 1,580,409. This traffic includes coal, coke, fuel oil, lumber, cotton, general merchandise, and a large tonnage of products, both in and out of the estuary harbor. The estuary harbor is entered through a drawbridge at Webster street. As indicating the amount of water transportation into this harbor, the records show that this bridge has been used in the past year 18,000 times. This traffic was carried by 179 registered steamers, 460 registered sailing vessels, and 2,524 unregistered craft.

One of the railroad companies employs trackage along the west shore water front and the other roads have franchises for rights of way running parallel with the tracks now in operation.

Port Los Angeles.

Los Angeles harbor facilities were acquired by the city of Los Angeles through the consolidation of the cities of Los Angeles, Wilmington, and San Pedro. This harbor was originally composed of San Pedro and Wilmington harbors, known as the outer and the inner harbor in San Pedro Bay. For the purpose of the expenditure of $3,000,000 bonds voted by the consolidated cities, the dividing line between the outer and inner harbors has been located just north of the turning basin in the inner harbor. The outer harbor was created by the building of a breakwater by the Federal Government. This breakwater is 9,250 feet in length, beginning in 24 feet of water and ending in approximately 50 feet. The construction is 122 feet to 194 feet wide on the bottom; is 38 feet wide at low water, and 20 feet wide on the top, and extends 14 feet above lower low water. The cost was approximately $3,000,000.

This breakwater affords a protected area of 575 acres, having a depth of from 20 to 30 feet. The inner harbor is connected with the outer harbor by what are termed the east and west jetties, which include the entrances to a channel extending into the inner or Wilmington harbor 2.5 miles. This channel has a depth of 26 feet, except that for a short distance in the entrance the depth is only 20 feet; the width is from 500 to 900 feet, and ends in a turning basin 1,600 feet in diameter. There is now a channel 18 feet deep and 100 feet wide on the bottom, extending 2 miles northeast from the turning basin, and another channel of the same dimensions extending around the west side of Mormon Island.

The Federal Government has expended in this harbor, including the breakwater, $4,538,097. The Rivers and Harbors bill of 1910 provides for the expenditure of $178,000 in closing the gap between the breakwater and the shore, and thus extending the present breakwater to a total length of 11,050 feet. The same bill provides $400,000 for dredging and deepening the channels. The total appropriations amounted to more than $5,000,000.

The frontage of these harbors, when the Government and city work shall have been completed, will total about 47 miles. There is now constructed and in active operation approximately 18,000 feet of wharves in the inner basin. Private shipping interests are also engaged in extending improvements of the outer harbor.

For the year ended June, 1910, the arrivals of vessels at Port Los Angeles totaled 2,432.

The net tonnage carried was 1,478,633. The chief receipts by water at Port Los Angeles were lumber and forest products, amounting to a total of nearly 650,000,000 feet, board measure; 1,250,000 linear feet of piles, poles, and spars. In addition to these incoming shipments and the general merchandise, there were received about 12,000 sheep and cattle by water.

San Diego Harbor.

San Diego harbor in surface contour is in the form of a crescent; has a length of about fifteen miles, and a width varying from three fourths of a mile to two miles. The surface area is twenty-two square miles. On the bar, at the entrance to the harbor, there is a present channel 150 feet wide, with a depth of 28.5 feet of water at low tide; this channel extends to a depth of 25 feet at low tide, where the width is 800 feet. Just inside the entrance to the harbor is a stretch of sand of which the depth is only about 25 feet at low tide, and vessels at the present time, which draw a greater amount of water, have to make a sharp turn and take the north channel, where there is 60 feet of water.

The anchorage area in San Diego harbor is about eight square miles;



Panoramic View, San Diego Harbor.

the tidal range about 5.5 feet. The harbor is landlocked, and no disaster caused by the elements has ever occurred inside of the harbor. The entire bed is composed of soft mud, being firm enough to afford the best anchorage, and as no rock formation has ever been discovered inside the harbor, there is no danger of accidents to vessels should they leave the main channel. The wharves or docks are inadequate to the growing needs of commerce, and the city of San Diego has now under consideration a detailed plan for their improvement and extension. At the present time there is dockage space of about 2,500 feet, owned by private shipping interests. In the plan which the city is now developing, it is proposed to add 22,000 feet of seawall at a minimum depth of water at low tide of 35 feet. This construction will reclaim 900 acres of land, which can be used for commercial purposes, being situated from one to two miles from the business center. A belt line railroad is also contemplated to connect this system of docks with terminal railways.

The Federal Government has expended on this harbor some $650,000, the major portion of which amount was used in the construction of a jetty, beginning near the entrance of the harbor, running parallel therewith to Point Loma. The only dredging that has been done in the harbor, except on the bar, amounted to $30,000. The last Congress appropriated $125,000 for dredging the bar to a depth of 30 feet at low tide, and for a width of 600 feet. The distance across the bar is 1,900 feet, and it is estimated that with an expenditure of something less than an additional $125,000 the bar can be deepened to 35 feet at low tide for a length of 3,700 feet; from that point the depth is already 60 feet. Government engineers have determined that by the construction of a small jetty, which would lessen the width of the entrance near the bar, the depth of 35 feet at low tide could be maintained without further dredging than the first removal of that portion of the bar. The present appropriation will remove the middle ground just inside the entrance to the harbor, and allow entrance for any sized ship. For a distance of eight miles from the entrance there is a channel 2,600 feet wide, with minimum depth of 35 feet at low tide, a considerable part of it having a depth of 50 feet. From this point to that of twelve miles distant there is a minimum depth of 25 feet, and then the channel narrows to 1,000 feet with a minimum depth of 20 feet.

The merchandise commerce transacted at the port of San Diego by water for the two years ended September, 1910, is indicated by the arrival of 1,146 vessels carrying a net tonnage of 865,085 tons. The volume of this commerce totaled in value $2,283,851, nearly equally divided between outgoing and incoming shipments. The lumber receipts at San Diego for the two years included the arrival of 337 vessels and 6 pile rafts, carrying 68,000,000 feet in 1909, and 97,000,000

feet in 1910. For the year ended September, 1910, there were received 1,700,000 gallons of refined oil and 300,000 barrels of fuel oil, all of which was of California production.

The state bond issue for harbor improvement recommended by the Legislative Harbor Committee, includes $1,500,000 for the construction of a seawall on state property in the port of San Diego.

Port of Humboldt.

Eureka harbor, in Humboldt Bay, technically known to coast and ocean shipping as the port of Humboldt, is the northernmost port of entry on the California coast. Eureka is the chief town of northwest California, and the entrepôt for the Humboldt Bay region. The principal product of this region is lumber, which comprises more than 60 per cent of the total shipments from the port. In the year 1909 the lumber shipments, including exports, amounted in round numbers to 340,000,000 feet, having a total value of more than $6,000,000. The dairy products shipped during the same period amounted to about 6,500,000 pounds, valued at $1,600,000; other products brought the aggregate value of movements by water out of the port of Humboldt to $9,125,760. The off-shore shipments of lumber for 1909 included, besides Hawaii, foreign ports in Australia, South America, Tahiti, and Great Britain. These off-shore shipments totaled, approximately, 42,000,000 feet, valued at nearly $1,000,000, or about one sixth of the entire lumber shipments.

The total number of vessels arriving and departing in 1909 was 1,843: 1,757 steam, 86 sail, carrying a total net tonnage of 1,094,000. Total number of passengers carried, 33,912. The increase in value of shipments in 1909 over 1908 totaled nearly one half million dollars. Lumber shipments increased 40,000,000 feet. Increase in passengers amounted to more than four thousand. The total receipts at Eureka by water in 1909 included nearly $4,000,000 worth of general merchandise, fifty automobiles valued at $87,500, and 131,448 barrels of fuel oil valued at $125,700.

The geographical situation of Humboldt Bay is on the northwest coast of California, distant 216 miles north of San Francisco. It has a total length of about 14 miles, and an average width of from one half mile to four miles; tidal area, 28 square miles; navigable channels, 35 linear miles; average water frontage, 40 to 50 linear miles; approximate length of present wharfage, 2.5 linear miles.

This bay is of the deeper lagoon type, entirely landlocked, separated from the ocean by two sand spits or peninsulas. The bay consists mainly of two principal channels, known as the north and the south, due to their location from the main sea entrance. The average depth of



Eureka Water Front, Humboldt Bay.

water in the north channel varies from 23 to 46 feet at mean low tide for a distance of about four miles north from the entrance. The main south channel has an average depth of from 18 to 35 feet for about two miles south from the main entrance. The main channel or entrance from the ocean to the bay has been straightened and well defined by the erection of jetties, maintaining a depth of 22 feet at low tide. The construction of these jetties was done at an outlay of $2,000,000 by the Federal Government. Further similar work is essential to the permanency of this improvement.

CALIFORNIA MINING INDUSTRY

California has produced in the entire life of the mining and oil industries from 1848 to 1909, inclusive, mineral substances having an aggregate value of approximately $2,023,230,453. It is not possible to give precise figures, owing to the absence of much recorded matter and the incompleteness of many of the records, particularly for that period preceding 1887. This estimate of aggregate value for the entire life of the industry is based upon all available records and conservative possibilities of production not recorded.

For the period preceding 1887, the estimate includes the following figures of record: Gold, $1,169,374,715; quicksilver, $74,878,042; copper, $16,577,396; petroleum, $3,400,000; making a total for mineral substances accounted for of $1,264,230,153. It is safe to say a considerable valuation has not been accounted for, and that the substances thus omitted included values in structural and industrial materials which may be safely and conservatively estimated at $2,500,000, thus making the total estimated valuation for the period preceding 1887 $1,266,730,453.

In the period beginning with 1887, down to and including the year 1909, the total aggregate value of all mineral substances for these twenty-three years amounts to approximately $754,500,000. Of that amount the chief substances and their values are gold and silver, more than $377,000,000; petroleum, more than $136,000,000; quicksilver, more than $24,000,000, and copper, more than $49,000,000. This total of $754,500,000, added to the total for the years preceding 1887, makes the total aggregate value, as above stated, for the entire life of the industry more than $2,023,000,000.

Until 1907 gold was the leading mineral substance in point of value; in that year petroleum took first place, and in 1908 and 1909 California led all of the states in the value of petroleum production.

In 1909 the leading mineral substances and their values were as follows: Petroleum, $32,398,187; gold, silver, and platinum (estimated) about $21,000,000; copper, $8,283,202; cement, $4,954,210; quicksilver, $1,063,809. There was a total of forty-one mineral substances produced in the year of which those not here named composed structural and industrial materials, which amounted to a value of approximately $14,500,000. The total value of all mineral substances produced in California in 1909 was approximately $82,000,000.

Production of Gold.

The total output of gold from all sources including placers, quartz mines, and dredging operations from 1848 to 1909, inclusive, measures in aggregate value $1,508,275,250. This result is made up from tabulations by the State Mining Bureau and the United States Geological Survey. The greater part of the figures was prepared by Mr. Chas. G. Yale, special agent of the Geological Survey, and formerly statistician of the Mining Bureau.

The practical and commercially profitable discovery of gold in California was made by James W. Marshall in January, 1848. There are various records of the finding by Mexicans and Indians of gold dust and nuggets in prior years, and the Mexican Government claimed to have information of gold-bearing placers in California some years prior to that time, but no effort was made by that government towards development.

The early records of gold production, particularly for the first three years, were varied and exaggerated, that of 1848 being variously placed at from $5,000,000 to $10,000,000, while the actual output, as recorded by Mr. Yale, was $245,301. In 1849 the figures run from $20,000,000 to $40,000,000, while the actual output for that year was $10,151,360; in 1850 it had increased to $41,273,106. The years in which the output went about $50,000,000 were 1851 to 1856, inclusive. For those six years the record was as follows: 1851, $75,938,232; 1852, $81,294,700; 1853, $67,613,487; 1854, $69,433,931; for 1855 and 1856 the output exceeded $55,000,000 and $57,000,000, respectively. It declined from 1857 to 1861, but reached more than $40,000,000 in each of those years. This decline marked the gradual change from placer to lode mining. In recent years the gold production has been augmented by improvements in the treatment of the ores from the quartz mines and from increased dredge mining.

The first information or rumor of Marshall's discovery in 1848 was ridiculed by people in the East until there had been shipped large quantities of the native mineral, and letters had been written by army officers and others known to have had practical knowledge of gold mining in other parts of the world. After the news spread there was a large influx of gold-seekers, and the population which numbered about 15,000 in 1848 was increased to 100,000 in 1850, and the average annual increase for the following five or six years was about 50,000.

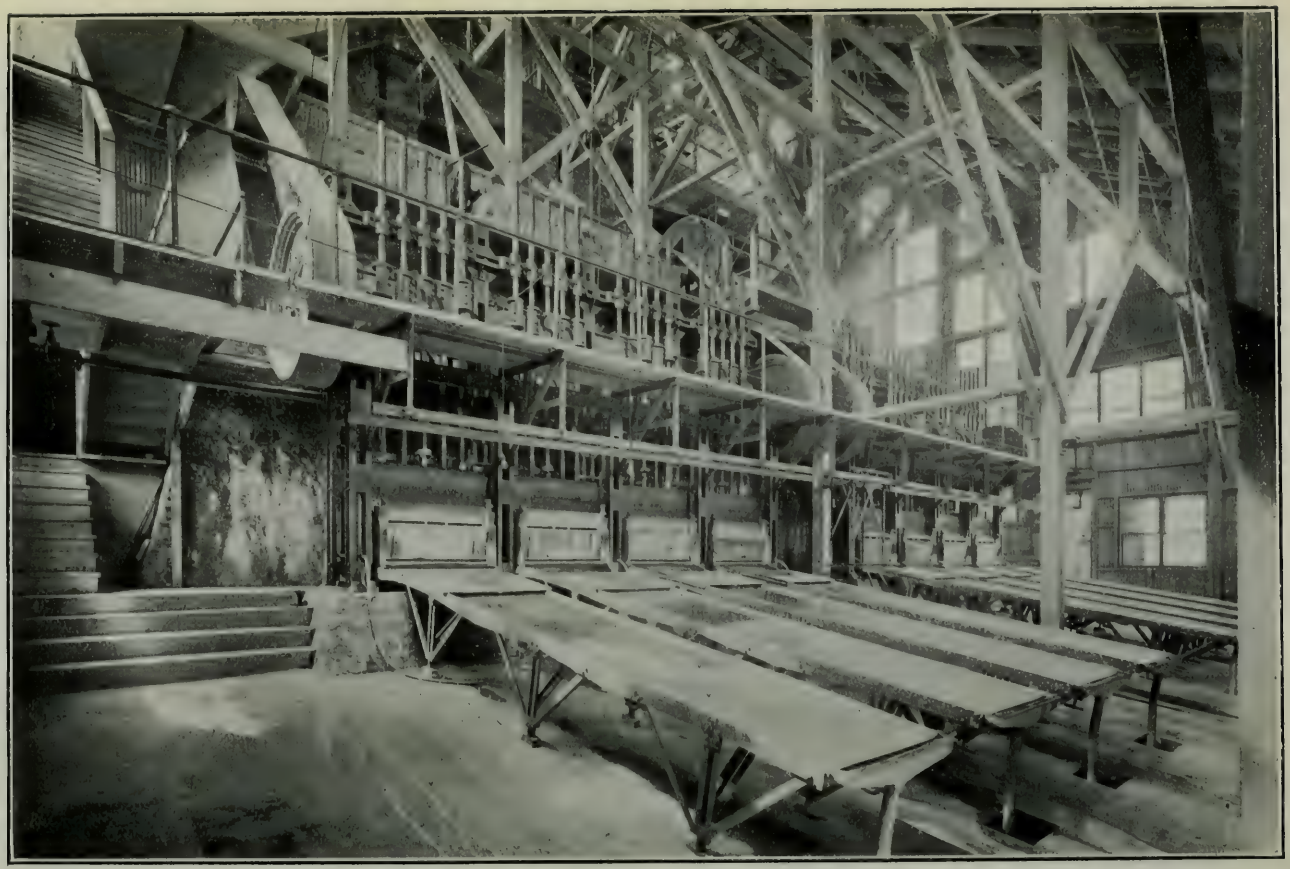
This astonishing evidence of the importance of Marshall's discovery attracted the attention of the world. Another evidence of the importance and value of this discovery was shown by the fact that in the period covered by the troublous times of the civil war, between 1861 and 1866, inclusive, California produced more than twice as much value in

gold bullion as was held in the United States treasury and the national banks of the country combined on August 1, 1866. The record of the output of gold from California mines for that period was $163,367,547. The records show that on August 1, 1866, there was bullion in the United States treasury to the amount of $61,000,000; in the New York banks, $5,000,000; in Boston and Philadelphia banks, $600,000; and in all other national banks, $1,600,000, making a total of $68,200,000.

In the single year of 1866 the western states and territories, including California, Montana, Washington, Idaho, Colorado, Nevada, and Oregon, produced $106,000,000 of gold and silver, which was nearly double the amount held by the United States treasury and national banks in August of that year. In the entire history of gold production in California from 1848 to 1866, inclusive, this State was officially accredited with adding $799,473,544 to the gold circulation of the United States, and thus materially aided the financial stability of the Federal Government.

In an exhaustive chapter on auriferous gravels in the ninth report of the State Mining Bureau for the year 1889, Mr. John Hays Hammond stated that prior to the gold excitement in California the assumed quantity of gold in circulation in the world was between $2,000,000,000 and $2,500,000,000, and up to 1899 the world's gold circulating medium had increased by $4,500,000,000, and fully one fourth of this increase had been derived from the gold mines of California. He also stated that not less than 90 per cent of the California gold production had been yielded by the auriferous gravels, and that the total quantity might be represented by the value of a cube of pure gold having an edge of fourteen feet. In the thirty-one years he stated that more than $1,000,000,000 had been invested in the operation of gravel mining in California.

Auriferous gravel mining declined after the surface placers had been thoroughly worked and the antidébris legislation operated against hydraulic and drift mining in a number of counties. In the periods of decline in gold production investments turned to the development of copper deposits and petroleum fields. In the last ten years gold production has very perceptibly increased from less than $16,000,000 in 1900 to about $21,000,000 in 1909. This increase is due chiefly to the improved methods of gold dredging and quartz mining in the treatment of gold-bearing quartz ores; there has also been great advancement, not only in improved stamp mills, but in the recognition by quartz miners of the fact that a large proportion of the ores, especially at depth, are refractory and require smelting or cyanidation. But still the great increase in the production of petroleum and of copper has continued to be an incentive to capital to give less attention to gold mining than the industry deserves.



Gold Mining Stamp Mill, Nevada County.

Early Quartz Mining.

Quartz mining as an extensive and profitable industry in California was begun in about 1861, although there were mills operating on free gold quartz in several counties of the State as early as 1851, and in 1858 there were 280 quartz mills dropping a total of 2,610 stamps. The cost of these mills was estimated at about $3,000,000. In the summer of 1861 these mills had been reduced in number to about 50. The mistake of the earlier day, although not wholly corrected, served a good purpose, and quartz mining and milling were reduced to a profitable basis.

The State Geological Survey of 1860-1865 recorded the production of gold from quartz mines in the latter part of that period in ten counties and fields, including Mariposa, Tuolumne, Calaveras, Amador, El Dorado, Placer, Nevada, and Sierra counties, and the Siskiyou and San Bernardino ranges. Mariposa County began quartz mining in 1852; Calaveras in 1861; Amador in 1861, and in that year there were four quartz mines in operation in El Dorado County. The production from quartz mines in 1861 was about $6,000,000; 25 per cent of that was produced at Grass Valley in Nevada County. One of the mills operated in Sierra County was built in 1853 and another in 1856; quartz mining became an extensive industry in that county in 1861. In Shasta County quartz mining began as early as 1853 in what was known as the Pitsburg district, on the north side of the Pit River, in the neighborhood of the present Bully Hill copper mine. There was a big boom in silver mining in Shasta County in 1880.

The era of deep lode mining in California became quite well established in about 1900, although there had been some deep mining prior to that time, but not extensively carried on. Bulletin No. 18, issued by the State Mining Bureau in 1900, presents a concise and valuable description of the geology of the Mother Lode counties, and is a plea for deep mining and further advancement in the methods of treating ores. Bulletin No. 6, issued by the State Mining Bureau in 1895 on California Gold Mill Practices, was at that time a standard work, and was valuable in improving mill practice. Still further improvements have followed in the past ten or fifteen years, although these have related chiefly to the additional application of cyanide processes, and the consequent increase in the weight of stamps. In the old practice the average weight of the stamp was 300 to 600 pounds. In the present day it has been increased to 1,000 and 1,200 pounds.

The advent of copper mining smelters and the application of cyanidation to the treatment of refractory ores were practically coincident in point of time. When the copper smelters became established they demanded large quantities of low grade quartz for fluxing, and there soon followed an application of smelting processes to the treatment of the higher grade quartz ores, especially those carrying large contents of

sulphurets. In sections of the State where the smelter was not available the cyanide process was applied, and as in the smelting a larger percentage of the actual values was obtained.

The practice of deep mining obtains at present in practically all the gold and copper districts of the State, and applies to free gold quartz mines, as well as to the gold-bearing sulphuret lodes. The greatest depth attained in America has been reached in the Kennedy (gold quartz) mine near Jackson, in Amador County. The lowest level is at 3,300 feet vertical depth, and the shaft has been extended more than 200 feet deeper, making a total depth of more than 3,500 feet vertical. Only two gold mines in the world are deeper—one in Australia, the other on the Rand, South Africa.

Gold Dredging.

There has been recovered from river beds and bottom lands along rivers in California more than $32,000,000 in gold by the dredging process from 1898 to 1909, inclusive. There was some production in 1897, but the record of production began in 1898, which included the output of 1897, and totaled $18,847. There was a gradual increase each year thereafter until 1903 when the production reached $1,488,556. In 1904 it increased to more than $2,000,000; in 1905 to $3,250,000; in 1906–07 each more than $5,000,000; in 1908 to more than $6,500,000, and in 1909 to $6,870,000, or a total of $32,147,877 for the twelve years.

Compared with placer mining by the methods of the sluice box and the hydraulic apparatuses, dredging for gold in the rivers of California is a recent innovation. The first successful dredge operated on this coast was in 1897, but as far back as the early fifties there was an effort made to apply the dredging system to the digging of gold from the beds of the streams. Mr. J. Ross Browne, in his first volume (1866) describing the mining conditions in California, tells of a New York company that sent a dredging machine to work in the bed of the Yuba River. Mr. Browne was inclined to scout the idea of a dredger being competent to take the gold out successfully and in commercial quantities; but there has been since that time an application of intelligence and experience to the operation of gold dredging which has resulted in a large addition to the mineral output of the State during the past ten years. The success of the endless chain bucket dredge in 1897 on the Feather River, near Oroville, was the beginning of what has since proven to be a large industry that has converted many thousand acres of river bottom lands, agricultural farms, and orchards into gold-bearing districts. The gravel work on the Feather River was initiated by a system of pit digging and the operation of the centrifugal pump to carry out the water; while the gravel was hauled out in wagons and washed in sluice boxes. This necessitated the handling of the gravel several times by manual labor,

but in spite of this expensive method of operation, the undertaking proved profitable. The first active and practical work was begun under the dredging system upon land aggregating about 1,000 acres, which within five years was being operated by five dredges. In the beginning of the operation these endless chain bucket dredges were operated by steam, but within a few years electric power supplanted the steam. There have been unsuccessful attempts made to dredge with suction and other styles of dredges; and one of these old timers was still in evidence for several years after it had been proven impractical. As the dredging industry grew it extended to the Yuba and the Bear rivers, and into the counties of Yuba, Shasta, Siskiyou, Plumas, Trinity, Sacramento, Calaveras, and Stanislaus.

The complaint that the farms and orchards were devastated, and that the land was ruined was quite general throughout the districts, but it has since been proven that much of this land, after the gold has been taken out, is capable of reclamation, and it equals its former productivity. Some of this reclaimed dredged land has proven to be adapted to the growth of hardy varieties of timber, particularly eucalyptus. In some sections the reclaimed lands have been replanted to orchards and farms. In addition to these uses of the dredged lands the operation of dredging has aided in the raising of the banks of levees and deepening the channels of streams; and the large quantities of the rock and boulders thrown out have been crushed and employed in road construction and the manufacture of concrete.

Bulletin No. 36 was the first valuable contribution by the State Mining Bureau to the gold dredging industry. It describes the productive gravel area known at that period (1905), discusses the geological and other conditions that govern the gold dredging industry; contains tables, sketches, photographs, and text delineating and describing the mechanical and scientific construction of dredges and buckets.

A second edition of this bulletin was issued in the fall of 1910 by the State Mining Bureau as Bulletin No. 57. It is a more extensive and more effective and valuable work than the former. It deals with historical, geological, and practical operations and dredge construction, and describes operations in the nine counties of the State in which gold dredging was in progress in 1910. These counties were Butte, Placer, Yuba, Sacramento, Calaveras, Merced, Stanislaus, Shasta, and Siskiyou.

In Butte County there are four districts besides Oroville. In 1910 Oroville had twenty-five dredgers in operation, and the other districts a total of five dredgers. Sacramento County had nine, Yuba County fifteen, and the balance of the counties had a total of nine, making an aggregate of sixty-three in operation in 1910. These sixty-three dredgers, with three others in course of construction, represent an investment of more than $7,000,000. In addition to this investment,

there were some thirty-eight dredgers formerly in operation, which had been dismantled or remained idle, owing to their small capacity and the general improvement in dredge building. These represent an added investment of about $1,750,000.

In the beginning of 1905, according to Bulletin No. 36 of the State Mining Bureau, there were in Butte County twenty-eight dredgers in operation; one in Calaveras; five in Sacramento; two in Shasta; two in Yuba; one in Trinity; and one in Siskiyou, making a total of forty, which was an increase of nine in two years. In the five years following 1905 the number, as shown, has increased by twenty-three, of which three were constructed in 1910. These facts show a steady and substantial advancement in the gold dredging industry.

As a further evidence of the importance of gold dredging the State Mining Bureau's records show that in 1908 the total gold production of the State amounted to $18,761,589; that of this amount $6,536,189 was produced by dredging, while the hydraulic and surface placers produced less than $2,000,000.

Bulletin No. 57 contains also invaluable information regarding dredging fields in other states of the United States, and in Alaska, the Philippines, and the various other countries that produce gold by dredging operation.

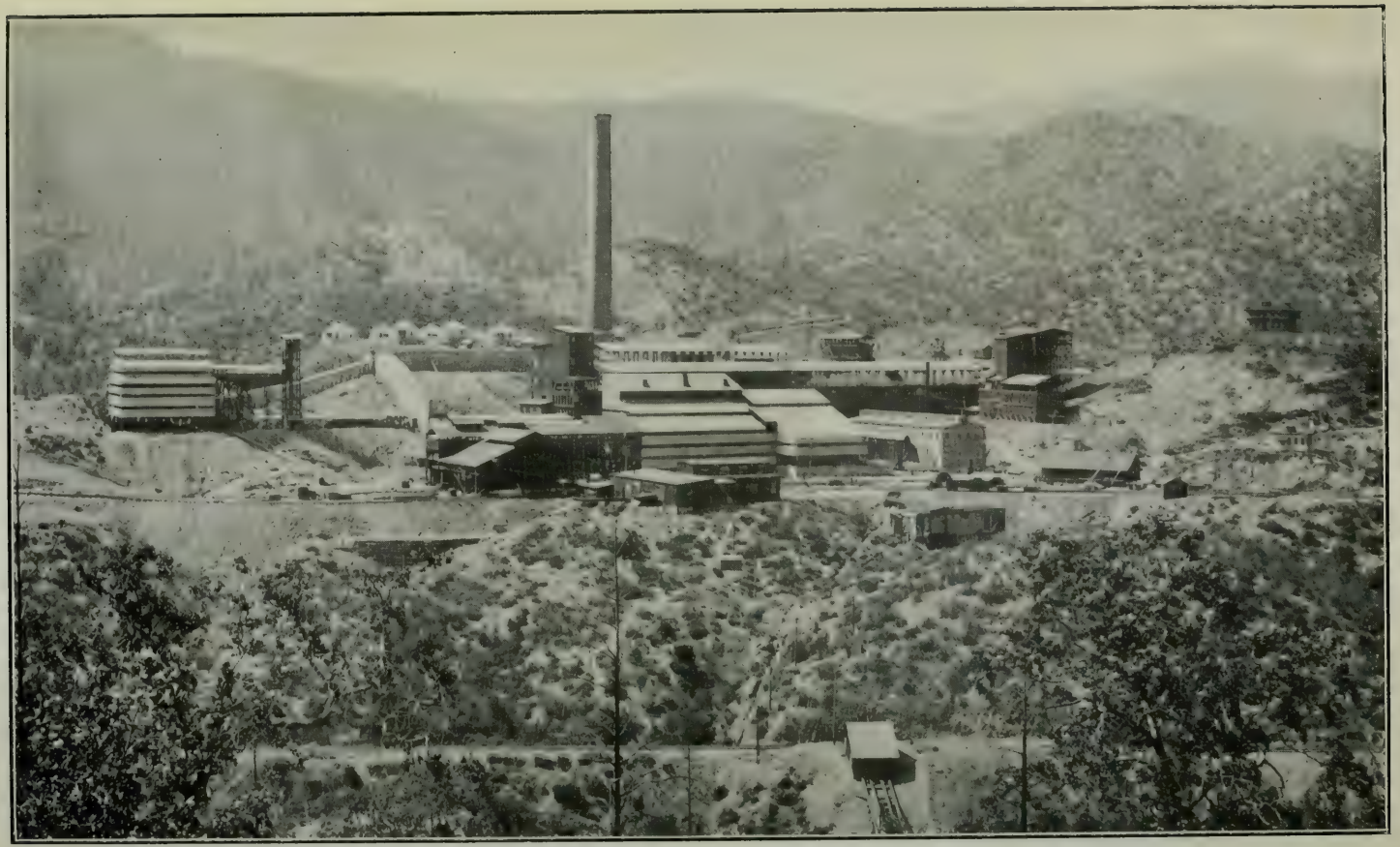
Copper Mining Industry.

Copper mining as a commercial industry in California had its beginning in 1861, and from that year until 1909, inclusive, there have been produced approximately 500,000,000 pounds of copper, valued at about $66,000,000. The profitable mining of copper was initiated in the Napoleon mine in Calaveras County in 1861, and was quickly followed by the Copperopolis in the same county. From 1862 to 1865 Calaveras ranked first and Del Norte second in the output of copper ores.

The first recorded commercial output was in 1861, when 1,750 tons of copper ore, valued at $122,581, were shipped to Boston and Baltimore, and to Swansea in Wales. In 1862 New York, Boston, and England were included. The banner year of the early period of copper ore production was 1865, when 25,830 tons of ore, valued at $70 per ton, or about $.36 per pound, were produced. The highest price paid for copper in the history of the industry in California was $.4625 per pound in 1864. The production that year was 14,315 tons of ore sold at a valuation of $139 per ton. There are records of copper production for all the years except 1875 to 1881, inclusive. The production in those years was small and has been estimated at about 1,000 tons per year, or 1,400,000 pounds of copper for the seven years. For the years 1882 to 1909, inclusive, the State Mining Bureau gives the total output of copper at 471,646,029 pounds, and the total value at $58,255,421.



Copper Smelter Converters, Shasta County.



Copper Smelter, Shasta County

This makes a grand total of 499,576,150 pounds of copper, valued at $65,962,181. The average price of copper in 1909 was $.1275 a pound: The average price per year for the forty years of the life of the industry has been $.1340 per pound. The lowest average price was $.0956 in 1894; in that year California produced 738,594 pounds. Since that time there has been a steady increase in quantity and a fairly constant price. In the early years of the industry the decline in production was evidently influenced by the decline in price, but in later years, from 1887, the variance in price has had no material effect upon the production.

A number of copper prospects, particularly those lying south of Nevada County and along the Coast ranges, have been developed in later days as producers of copper pyrites, and operated chiefly for their chemical values. The copper mines of the greatest productivity in the state are those in which the ore is an iron sulphide, occurring usually in lenticular form; the copper contents varying from about 2 per cent to 8 per cent. The copper values found in the chalcopyrite ores are of higher percentage; these ores are usually in ledge form, where they are found in the form of deposits, and are less regular, and have not been accepted by the larger investors as being of as great value as are the sulphide ores found in lenticular form.

Of the fifty-eight counties in California evidences of occurrences of cupriferous ores have been found in thirty-seven and in fifteen of these counties there is a present production, commercially profitable. The copper-bearing sections of the State may be divided into three parts; the most productive lying north of Red Bluff, of which section Shasta County is the most important. Another section may be described as lying between Red Bluff and Fresno; and the third, including all that portion of the State south of Fresno. The counties in which copper is now produced in commercial quantities profitably are Shasta, Calaveras, San Bernardino, Madera, Del Norte, Amador, Nevada, Mariposa, Riverside, Inyo, El Dorado, Merced, and Imperial.

The most important copper mining operations for the past fifteen years have been carried on in Shasta County in two districts: the Iron Mountain district, lying on the west side of the Sacramento River, where the croppings are usually gold-bearing gossan and the ores of iron sulphide in lenticular form; Bully Hill district, lying east of the Sacramento River and chiefly north of the Pit. The ores in this district are largely chalcopyrite, carrying some gold and silver. The chief mines operated in the Iron Mountain district are the Iron Mountain, the Shasta-King group, the Mammoth or Little Backbone group, and the Balaklala. The principal mines in the Bully Hill district are the Bully Hill and the Afterthought. There are various mines of less importance of large prospective value.

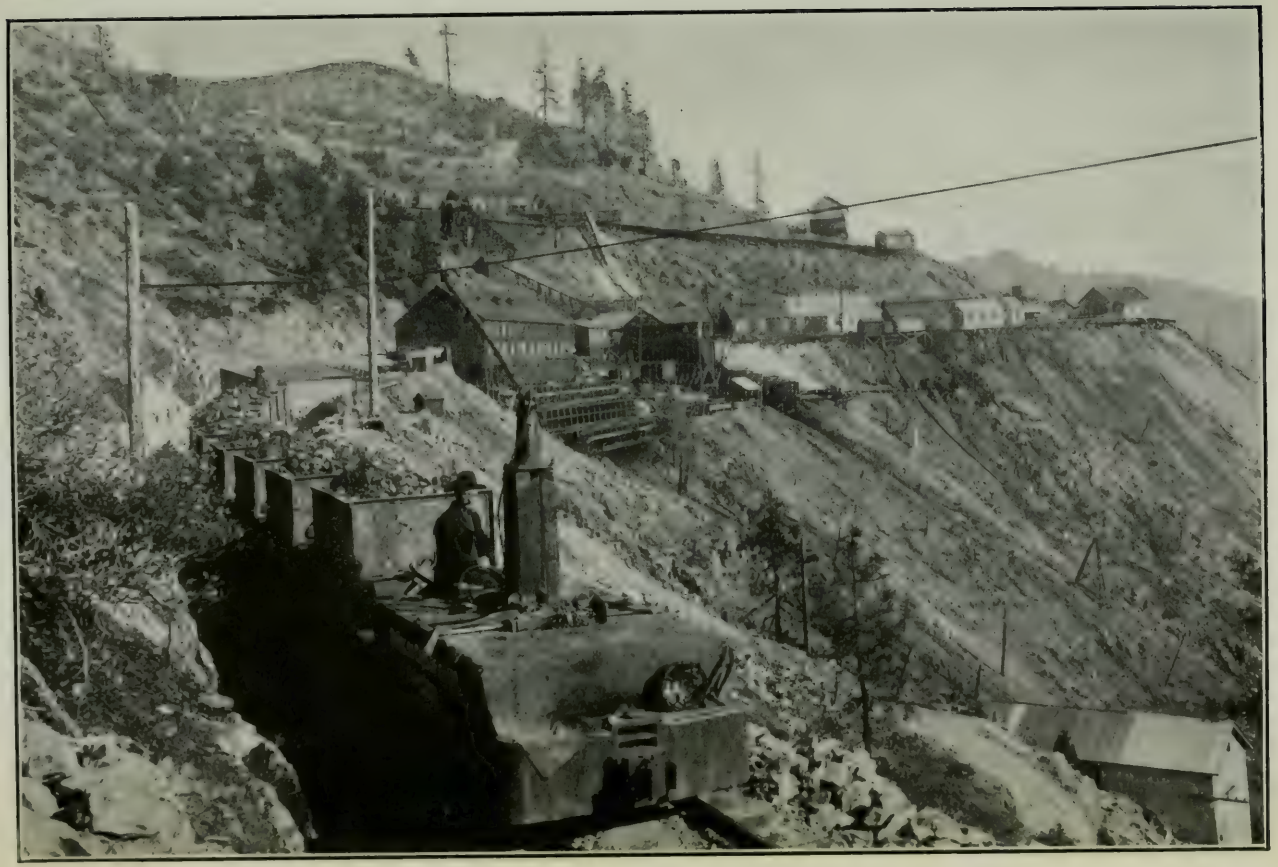
Quicksilver Industry.

The first commercial production of quicksilver in California of which there is record was in 1850; in that year there were produced 7,723 flasks, which sold at $99.45 per flask. The New Almaden mine, in Santa Clara County, produced the major portion of that output, and continued to be the biggest producer for fifteen years, when the New Idria began producing. In the sixty years, from 1850 to 1909, inclusive, the total production of quicksilver was approximately 2,107,147 flasks, the approximate value of which was $100,291,862. The production from 1850 to 1886, inclusive, based on the census and reports of the United States Commissioners, was approximately 1,485,885 flasks, having a total approximate value of $74,878,042; the records from 1850 to 1886, inclusive, give only the total production and the average price per flask for each year. Without making a detailed calculation, the figures here set down are considered sufficiently approximate for the purpose of showing the general productive condition of the quicksilver industry. The highest average price paid in the life of the industry in California was $105.18 per flask in 1874; in that year there were produced 27,756 flasks, which at the price named made a value of $2,919,376 for that year. The largest total value received for quicksilver in one year was $4,047,637.50 in 1875, when there were produced 50,250 flasks, which sold for $84.15 per flask. The largest number of flasks produced in one year was 79,396, which sold at $37.30 per flask. The lowest price paid in the life of the industry was $28.23 per flask in 1882, when 52,732 flasks were produced. The prices in the early days varied from about $36 to $99 per flask. The annual average price for the first thirty-seven years was $50.38 per flask; for the past twenty-three years the annual average price has been $40.90 per flask. The average production for the first thirty-seven years was 40,159 flasks per year; the average production for the twenty-three years ending with 1909 was 28,239 flasks.

The quicksilver deposits of the State are chiefly in the Coast ranges; there are some exceptions, notably in Siskiyou and Trinity counties, the first productions having come from San Benito, Santa Clara, Napa, and Lake counties. What is considered the main quicksilver belt extends from Lake and Colusa counties in a southeasterly direction into Napa, Yolo, Solano, Santa Clara, Stanislaus, San Benito, Monterey, Kings, San Luis Obispo, and Santa Barbara.

Structural and Industrial Materials.

The structural and industrial materials drawn from mineral substances in California have in the past twenty-three years aggregated a total value of more than $137,535,261, or approximately more than one half the aggregate gold production for the same period, and approxi-



Electric Tramway in Copper Mine, Shasta County.

mately equal to the production of petroleum. These materials are found in both the Sierra Nevada and the Coast ranges.

The principal and most valuable of these materials recorded in Bulletin No. 38, State Mining Bureau, embraces a fine variety of building stone, including granite, marble, onyx, sandstone, volcanic stuffs; trappean rocks and basalt; various clays, and other earth products; borax, cement, mineral water, salt soda, asphalt, natural gas, pyrite gypsum, lead, mangnesite, maganese, mica, mineral paint, platinum, quartz crystals, soapstone, sulphur, tungsten, tin, zinc, chrome, graphite, infusorial earth and glass sand.

The granite and sandstone of California, as shown by the practical employment of these stones in the architecture of San Francisco and other cities, are of the best quality and of the greatest abundance. There is probably no state in the Union that can produce better or more granite and sandstone than are produced in California. A proof of the quality was shown after the earthquake and fire of 1906.

Borax has assumed a commercial aspect that has attracted attention throughout the country; it has been largely productive for about twenty-five years. In the twenty-three years ending with 1909 there were more than 845,000,000 pounds produced, valued at more than $18,500,000. California is sixth in the list of salt-producing states, and for the past ten years has produced 100,000 tons annually from the waters of San Francisco Bay.

These structural and industrial materials have in the twenty-three years produced an annual value of nearly $6,000,000.

California Gems.

There has been more actual mining for gems in California than in any other state in the Union, although the earliest record of production was in 1900. In that year $20,500 worth of gems, including ornamental stones and jewelers' materials, were produced, and there has been a steady increase, with the exception of one year, until 1909, when the values amounted to $189,040. There are about fifty various minerals of the gem species mined in California, of which the following named are the nine most prominent: diamond, tourmaline, kunzite, topaz, jade, garnet, opal, turquoise, amber; the abalone pearl is also a gem of some importance. The diamond was probably the first of the gems discovered in this State, the original being found shortly after the discovery of gold and described in the American Journal of Science, September, 1849. That particular diamond was lost or destroyed. The next one of record was discovered in 1853 in the Cherokee gravel mining district in Butte County. In 1867 several California diamonds were exhibited before the California Academy of Sciences, and included the Cherokee diamond, one from Fiddletown, Amador County, one from El Dorado County, and one from French Corral in Nevada County. Kunzite is a

rare mineral, usually associated with tourmaline. It is remarkable for its transparency and lilac color. It is also found in pale pink to white. The first discovery was in 1902 in San Diego County. Topaz has been found near Ramona in San Diego County; jade in Mariposa County; garnet in sixteen different counties; jasper principally in Calaveras and Plumas counties; opal in Siskiyou, San Diego, and Tulare counties; tourmaline in San Bernardino County. The abalone pearl is found in California waters; some have a very fine luster and many are of extreme size. One specimen is valued at $2,000.

State and Government Officials.

The Legislature appreciated quite early in the history of mining in California the necessity for technical and scientific observation of the distribution of placer gold and the occurrences of gold-bearing ores in place. In the second session of the Legislature (1851) Dr. John B. Trask was appointed State Geologist. He was succeeded in 1860 by J. D. Whitney. In 1866 the United States Congress made an appropriation and J. Ross Browne and James W. Taylor were appointed official commissioners to visit the Western States. Mr. Browne's duties brought him to California. In 1869 Rossiter W. Raymond succeeded Mr. Browne.

From 1874, when the work of State Geologist Whitney was concluded by action of the Legislature, until 1880 there was nothing done by the State toward dissemination of knowledge respecting the geological and mineralogical conditions. In the latter year the twenty-third session of the Legislature created the State Mining Bureau, and Henry G. Hanks was in May of that year appointed State Mineralogist. His successors and the dates of their appointments are here named. Wm. Irelan, Jr., June, 1886; Jas. J. Crawford, February, 1893; A. S. Cooper, February, 1897; Lewis E. Aubury, February, 1901.

Mining Legislation.

California had produced $785,349,677 in gold before any adequate law was enacted for the regulation of mining by either the Federal or the State government. In fact, the first attempted regulation was made by the provisional legislature, which merely provided for a charge of $20 a month to be paid by foreigners for the privilege of digging on the public lands. It was not until 1866 that the Federal congress enacted the first mining law which provided for the issuance of patents to mining claims, but which by its title was an act granting the right of way over the public lands to the owners of ditches and canals. Prior to that time California miners had made their own regulations, and in some instances the penalty of disobedience or violation of the rules of various districts was death. Two years prior to the passage of the Federal law there was a strong disposition in Congress and the East

generally to make such disposition of the mines of California and other states and territories as would pay the national debt. The proposition, which was seriously considered and which came near becoming a law, provided for the sale of the mining lands at prices that would add very largely to the income of the Government. Some of the advocates of the bill were not satisfied with the mere sale of the mining lands, but insisted that the law should also provide for the payment by the purchaser of a royalty in addition to the purchase price. But this bill was defeated, and the law governing lode and placer mining with various amendments is still the law which regulates lode and placer mining, and applies also to oil lands. The fact has long been known that the placer mining law is not adequate to the regulation of the petroleum industry. Neglect of Congress to pass an adequate law has given rise to a great deal of dissension and dishonesty.

In July, 1910, Congress passed what is known as the Pickett oil law, providing for the temporary withdrawal by the President of public lands applying to minerals known as coal, oil, gas, and phosphates. Following this action by Congress, the President has withdrawn from entry in the State of California approximately 3,000,000 acres of petroleum lands. By this action, which has been conceded necessary in order to straighten out the tangle caused by the effort to apply the placer mining law to the oil industry, a great many bona fide and honest oil operators have been temporarily put out of business, while others will suffer permanent loss. The Assistant Secretary of the Interior, and the Director of the Geological Survey, visited California recently to investigate the situation and to inquire as to the wishes and needs of California oil men, and there is a prospect that results will be attained in the coming session of Congress. President Taft's plan is to lease the oil lands, and not to sell them, to the operators. The plan has some advocates in the State and it has some opponents.

The impression has obtained for a number of years that hydraulic mining in California is prohibited by law. There is no law against hydraulic mining, either Federal or State. A joint resolution of the California Legislature brought the matter to the attention of Congress and that body passed an act providing for the appointment of a Commission of Engineers for the purpose of enforcing what is known as the Caminetti act. The essential features of this law are that auriferous gravel mines may be operated by hydraulic processes, provided the débris or tailings shall be impounded and prevented from entering navigable streams or injuring the land of other persons. This law practically applies only to that section of the State drained by the Sacramento and San Joaquin rivers and their tributaries. Hydraulic mining has not been interfered with in Siskiyou, Trinity, Humboldt, and Del Norte counties, for the reason that the operation of the mines there has not interfered with the streams or with adjoining lands.

CALIFORNIA PETROLEUM

In the active history of the petroleum industry of California, including the year 1909 and dating back to 1865, there has been a recorded production of 309,343,458 barrels of crude oil, having a total value of approximately $150,000,000. For the first ten years, ending with and including 1875, the production was 175,000 barrels. For the ten years ended in 1885 it had increased to 1,058,992, and for the next ten years ending with 1895 the total was 5,449,909 barrels. In the ten years ended 1905 the production reached 123,331,628 barrels. That was considered the wonder period of the oil industry, but in the four years ending with 1909 the production was more than 49,000,000 barrels greater than in all the preceding years of the industry, and amounted to 179,327,829 barrels.

It is quite probable that the figures representing the production of crude oil for the ten years ending with 1875 are made up of all the years preceding 1875 for which any record could be obtained. Unless the 175,000 barrels covered more than ten years, the average annual production per year would have been 17,500 barrels. In 1876 there was a production of 12,000 barrels, and a steady increase from that time on until 1888. In 1882 the production had reached more than 100,000; in 1884 more than 200,000, and in the following two years more than 300,000. It was practically doubled in 1887 and 1888, but in 1889 there was a decrease to 303,220 barrels; from that year the production increased.

Details of Production.

The first year in which more than 1,000,000 barrels were produced was 1895; the 2,000,000 barrel record was reached in 1898, and more than 4,000,000 in 1900; which amount was doubled in 1901, and increased to 13,984,268 barrels in 1902. In 1903 it exceeded 24,000,000 barrels, and in 1905 and 1906 more than 30,000,000; 1907 more than 40,000,000; 1908 more than 48,000,000, and in 1909 more than 58,000,000. The value for 1909 was $32,398,187.

For the first half of the year 1910 the production was about 34,500,000 barrels. For the nine months ending with September, the production was about 56,500,000 barrels. The production for January

was greater than that of February, but for the succeeding months there was a steady increase until August, when the production was more than 7,250,000 barrels. There was a decrease in September, owing somewhat to the withdrawal of certain lands from entry.

The crude product in 1909 was taken from eighteen fields; the Kern River, McKittrick, Midway, Sunset, Coalinga, Watsonville, Santa Maria, Lompoc, Arroyo Grande, Summerland, Santa Paula, Ventura, Newhall, Salt Lake, Los Angeles, Whittier, Puente, Fullerton-Brea Cañon. The total production for the year has been variously estimated from more than 56,000,000 to more than 58,000,000 barrels. It is sufficient for the purposes of this history to record the production for 1909 at approximately 58,300,000 barrels. The biggest producer in the field above mentioned, Coalinga, was 15,406,620 barrels; the next was Kern with 14,508,240. The McKittrick field produced nearly 6,000,000 barrels; the Midway approximately 2,500,000, and the Sunset nearly 2,000,000. These three last named fields are so closely connected with the Kern River geographically, topographically, and commercially, that the four might be presented as one grand field in four divisions. The total production for these four fields in the year 1909 was 24,535,800 barrels.

In the order of the fields as they are usually presented Santa Maria would be third in the list of producers with more than 7,500,000 barrels; the Fullerton-Brea Cañon with 4,250,000, fourth, and the Salt Lake field with 3,800,000 barrels is fifth in the list.

The average price of crude oil in the field in the year 1909 was 54 cents per barrel; the general range in prices being from 45 cents to 70 cents; there was some very high gravity oil that sold for as high as $1.10 per barrel, but the quantity was small, comparatively, amounting to less than 100,000 barrels. The ordinary high gravity oils which are sent to the refineries are derived chiefly from Santa Maria, Coalinga, Watsonville, Whittier, Ventura, McKittrick, and Puente fields. In all of these fields there is also a lower gravity oil which is used for fuel.

As an evidence of the constancy of the producing wells in the various fields of California, the following figures showing the total production, the average number of wells, and the average output per well per annum, are presented. These figures are derived by a comparison of the printed official reports and the estimates made by the field men of this Bureau. There is no pretense in this writing to preciseness as to production, because that would be a very difficult matter until all official reports of State and Government bureaus are published. The reports of the United States Geological Survey and the California State Mining Bureau, and the big oil-producing companies, do not always agree as to exact figures, so for the purposes of this report these approximate figures in round numbers are sufficient.

In 1903 the total production for the year, covering all fields, was

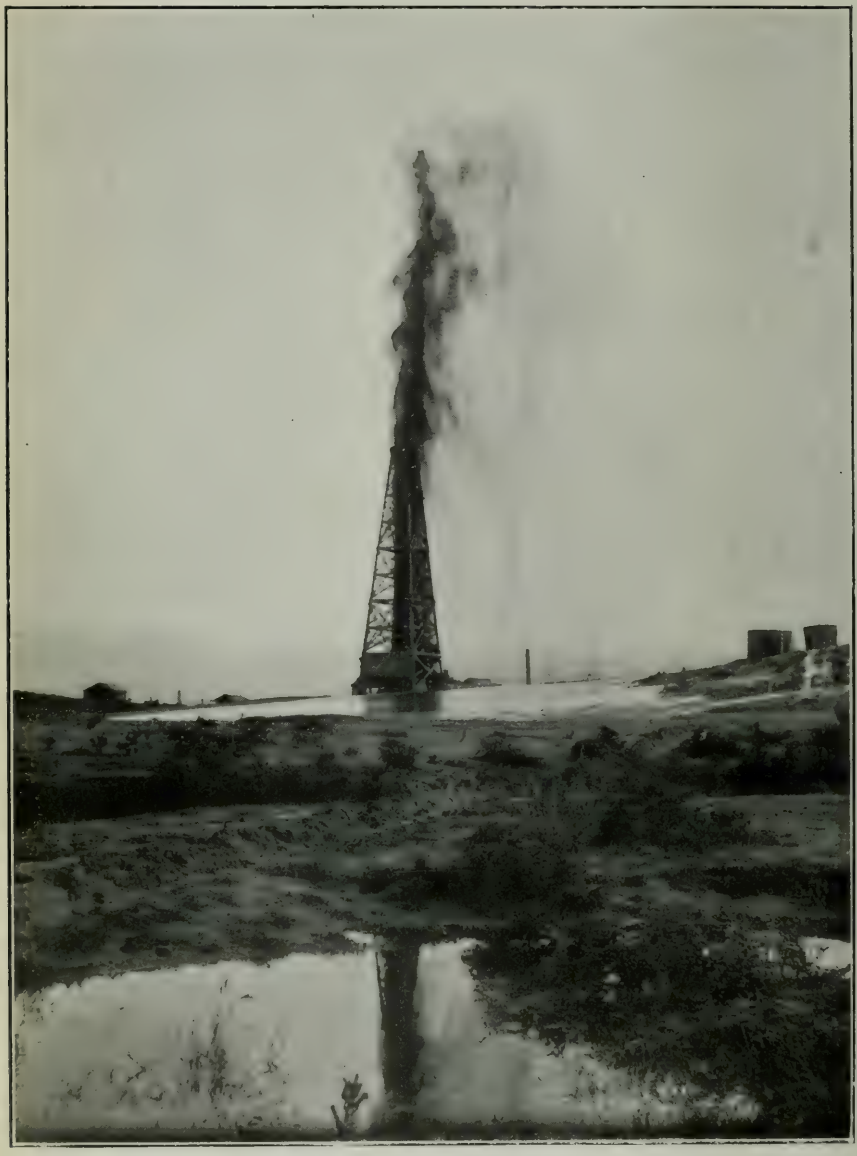
24,350,000 barrels, produced from an average of nearly 2,500 wells, showing an annual yield per well of approximately 9,658 barrels. In three years the production had increased 10,000,000 barrels, or to approximately 33,000,000 in 1906. There were in operation in 1906 nearly 2,400 producing wells whose yield was an average of 13,853 barrels per well in the year. In 1907 the production increased to 40,000,000 barrels; a little less than 2,650 wells producing an average per well of 15,188 barrels. In 1908, 48,000,000 barrels were produced from more than 3,100 wells, whose yield was 15,308 barrels per well. The production in 1909 reached approximately 58,250,000 barrels; the number of wells had increased to more than 3,700, producing an average per well of 15,686 barrels.

The record of these years, from 1903 to 1909, is here given in a general way for the purpose of showing that the increase in average production of the wells in California fields throughout a series of years is found to be almost constant. This is a feature of the California oil fields that has attracted the attention of the United States Government and the large consumers of fuel oil, and it is the feature that has impressed the government officials with the belief that California is capable of producing a sufficient quantity of oil for an indeterminate number of years. The prices that California oil has brought, or the prices it may bring in the future, is not so important as the fact that the increase in the flow or the gush or the pumping of the oil from the wells has remained practically constant for the past ten years. It is only a question of developing the resources to satisfy consumers of California oil for fuel purposes that there is a sufficient supply to warrant preparations for its vast consumption.

It should not be understood that the total production of California crude petroleum goes into fuel, either directly from the field or indirectly through and from the refinery. The following classification of deliveries and distribution of California crude oil in 1908 is approximately and conservatively an average of the proportional distribution for the past five years. The production that year was in excess of 48,000,000 barrels. The deliveries totaled 45,139,888 barrels, distributed as follows: Direct for fuel purposes, 25,080,332 barrels; direct to refineries, 17,559,556 barrels; for gas making 2,500,000 barrels. The quantities used for road oiling and minor purposes are not included in the records of deliveries. A considerable quantity of the crude oil delivered to the refineries is turned into fuel, after taking off of the lighter contents.

California Oil Gushers.

The production of crude petroleum in California was very largely augmented in 1910 by the bringing in of a number of wells in what is termed in oil parlance the gusher class. A great deal of the oil thus



Lakeview Oil Gusher, Kern County.

produced was lost through lack of storage capacity or inability to control the flow. These gushers in the present year, which were chiefly in the Midway field, have proven to be the biggest producers in the gusher class ever brought in in the California fields. In former years wells that produced 10,000 to 15,000 barrels a day were considered big gushers. Those of the present year have reached as high as 30,000 to 60,000 barrels a day. Usually a gusher well does not produce constantly, but has a continued diminishing output, then to a reasonable flow of from 500 to 2,500 barrels per day. In the earlier history of California oil production a well that flowed over 1,000 barrels a day was considered a gusher, but oil men of the present day look upon such producers as being merely big flowing wells. In the pioneer oil days, from 1878 to 1882, there were wells drilled that flowed spasmodically over the casing, and produced as high as 300 barrels per day; they were considered record-breakers at that time.

The first of the so-called gusher class was in Adams Cañon, near Santa Paula, which came in with an initial flow of 1,500 barrels a day. It was the first big well in that vicinity, and the operators were not prepared to take care of the oil, but were compelled to let a large quantity of it run down the cañon to the Santa Clara River and thence to the ocean. But it was soon after controlled and produced a total of 40,000 barrels before it ceased flowing. The next big well of which there is record was in the Coalinga field, in 1899, having an initial flow of 1,500 to 2,000 barrels a day, although its average production was considerably less than that amount. In 1902 a 2,000-barrel well was brought in in the Santa Maria field; in the same field in 1904 the first real gusher was brought in. This well maintained an average production of approximately 12,000 barrels per day for a considerable period. It is now on the pump, doing an average of 250 barrels a day. Another well in this vicinity began with several thousand barrels daily production, and is now flowing and producing about 2,500 barrels per day. In 1907 another well in the same field came in with a production of 7,500 barrels a day, and is still flowing. Still another began with 5,000 barrels a day. In the eastern extension of the Santa Maria field two gushers were developed by one company; one having an initial flow of 10,000 barrels per day, which it maintained for several months, and for nearly two years has been producing 1,600 barrels per day. The other came in on the pump in 1910, and after a few weeks began flowing and increased its output until it reached a maximum of 8,000 barrels per day, and maintained for several months an average of 7,000 barrels per day.

The first big and really phenomenal gusher developed in the Coalinga field was brought in in 1909 and produced 40,000 barrels of 23-degree gravity oil in seventy-two hours. The highest daily production was 20,000 and 25,000 barrels. There were six other wells in the Coalinga

field, which for the first six months produced an average of about 1,000 barrels per day each. Another owned by the same company was brought in with a production of 20,000 barrels per day, which it maintained for a short period. There have been numerous other big producers in the Coalinga field.

In the McKittrick district in Kern County, one well coming in with 1,500 barrels per day, maintained a production of 1,000 barrels a day for several months. This well has continued a good production for ten years. Several other big wells developed in this district. In the Kern River field one of the earlier wells flowed 1,000 barrels per day for about two weeks; another 1,500 barrels per day, and still another estimated at 7,500 barrels.

The Sunset-Midway field has the record for producing the biggest gushers in the State. One well, which came in about a year ago with an initial production of approximately 3,000 barrels, settled down to 2,200 barrels, which production it maintained for several months. But this is one of the smaller of the gusher class, and has been followed in that field by three wells producing 14,000 barrels, 22,000 barrels, and 30,000 barrels, respectively. These were on what is known as the Midway Flat.

In March, 1910, the most spectacular gusher California has produced came in with a production of 15,000 barrels. Within three days the flow was increased to about 40,000 barrels. This production was maintained until the middle of July, when the well declined to about 18,000 barrels per day. The greatest rate of production for a short period was 68,000 barrels per day. The total output of this well for the first six months was, approximately, 5,000,000 barrels. Since then there have been two others of the gusher class brought in in the same field, the last one in the month of November, which reached from 20,000 to 30,000 barrels a day.

Flowing wells that produce from 500 to 2,000 barrels per day are numerous, and many of them maintain that rate for long periods. The gravity of the gushing wells is usually of a medium degree, although it often reaches a very low mark. Occasionally these gushers show a high gravity. The higest gravity recorded is 23 degrees Baumé, which was that of the first gusher brought in in the Coalinga district.

Asphalt and Bituminous Rocks.

California produced, in 1909, 136,664 tons of asphalt and 34,123 tons of bituminous rock. The aggregate value of the two substances was $1,825,595. The earliest record of the production presented by the State Mining Bureau, in 1887, gave the output of asphalt as 4,000 tons, valued at $4 per ton. The bituminous rock production for that year was 36,000 tons, valued at $4.45.

In the twenty-three years, 1887 to 1909, inclusive, the production of asphalt amounted to 761,846 tons, of a total value of $9,357,662. The production of bituminous rock amounted to 804,045 tons, of a total value of $2,721,099. The average price of asphalt in the twenty-three years was $12 per ton; the average price of bituminous rock for the same period was about $3.40 per ton.

The original source of asphalt is in any of the petroleum fields which have a strictly asphaltine base, the product itself coming from the refineries; about 85 per cent of the refineries in the State produce asphalt in large or small quantities. The bituminous rock is not generally found in the fields that are largely productive of petroleum. The principal counties in California productive of bituminous rock are San Benito, San Luis Obispo, and Santa Cruz.

Bituminous rock is a natural mixture of bitumen and the including rocks, usually sandstone or limestone. It is obtained by quarrying or excavating, and is used for paving and roofing. While the records show a continued decrease in the production of bituminous rock in other states, the output in California has remained practically constant at from 25,000 to 40,000 tons a year. This State is the largest producer of any of the productive states in the Union. The other states that have produced bituminous rock are Utah, Kentucky, Arkansas, Texas, Georgia, also Indian Territory. The decrease in the production of bituminous rock has followed an increased production of liquid asphalt. But in some sections the preference is for bituminous rock, and thus in California the production has not decreased as it has in other states. The liquid asphalt, especially in California and Texas, is very largely used and is adapted to road dressing, and coating for wood and iron substances, and in the manufacture of building papers. In the refined state it is practically pure asphalt. The failure to more largely increase the production of liquid asphalt in California is due in a measure to the fact that the haulage to the Eastern markets is too expensive to be profitable. The Eastern States are supplied with natural asphalt for street paving from Trinidad and Venezuela; these asphalts also are refined and utilized for roofing and other metal paints.

In evidence of the lead that California has in the production of bituminous rock, liquid asphalt, and other like products of petroleum, this State in the year 1906 produced 91,957 short tons; Texas, 24,993; Utah, 12,947; Kentucky, 4,172; Indian Territory, 2,690; Arkansas, 900; and Georgia 400.

Figures showing the aggregate mileage of roadways and street paving constructed with bituminous rock and liquid asphalt are not available; but every city or large town of importance in this State has reaped the benefit of this character of paving material.

The fact that in the year 1909 the aggregate value of asphalt and bituminous rock was nearly $2,000,000, and that for the twenty-three years the total aggregate value of these materials has amounted to more than $12,000,000, is sufficient evidence of the commercial and industrial value of these substances.

Natural Mineral Gas.

The oil producers of California have been too busy taking care of the oil output of the wells to give a great deal of attention to the flow of gas, which is almost invariably associated to a greater or less degree with the oil. There are numerous wells which have proven to be gas wells exclusively, or from which the output of oil has been insignificant compared with the gas. Some of these gas wells are comparatively small affairs, and can be handled with little difficulty, and at small cost; others are enormous producers and wholly uncontrollable. One of the late gas wells, brought in in the Midway field, was in July, 1910, producing about 15,000,000 cubic feet of gas every twenty-four hours, and carrying with it explosions of rock and sand that were moved with such force as to be fatal if driven against an animate body within ordinary range. The pressure of this well was estimated to be not less than 2,000 pounds to the square inch.

The commercial production of natural mineral gas in California has not been recorded with precision, owing to the fact that for several years it was impossible to keep close account of the volume per 1,000 cubic feet. In State Mining Bureau Bulletin No. 55, the record of the value of the production for twenty-one years, ending with 1908, is given at $1,937,428. For the last six years of that time (1903 to 1908 inclusive) the number of thousand cubic feet is recorded at 1,593,915, at a value of $957,583, being an average of $.60 per 1,000 cubic feet. For the year 1909 the State Mining Bureau's returns show a production of 1,147,502 thousand cubic feet, valued at $616,447, an average of $.528 per 1,000 cubic feet. The value of the production for the fifteen years preceding 1903 is recorded at $979,845. Estimating the average price for that period at $.626 per 1,000 cubic feet (which was the price for 1903), the production may be placed at 1,565,231 thousand cubic feet for the fifteen years ending with 1902. This would make an aggregate total, by record and estimate for the twenty-one years, of 4,306,648 thousand cubic feet, and a total value of $2,553,875, which would make an average price per 1,000 cubic feet for the twenty-one years of $.593.

Records show that the first or initial discovery of mineral gas was made by Franciscan missionaries accidentally and without knowledge of its value in 1838 in Half Moon Bay, San Mateo County. The earliest record of practical development was in 1864, related in State Mining Bureau Bulletin No. 3, issued in the year 1894. This early development

was made in Sutter County at the base of the Marysville buttes, about six miles from Sutter City. Prospecting was also done in Colusa County in 1865 and further prospecting in Sutter County in 1891.

Inflammable gas with salt water was produced in Sacramento County in 1874 in two wells 1,600 and 2,250 feet deep. Productive wells have since been bored in that county.

Illuminating gas was discovered and developed in Stockton and San Joaquin County in 1889; the maximum depth of these wells was about 2,000 feet. The gas has been used profitably for industrial and illuminating purposes.

Inflammable gas has also been found in Merced County. In Kings County, near Tulare Lake, indications of gas in large quantities have been discovered; also in Sonoma County.

In Kern County gas is in most instances associated with petroleum in wells. Many of the operators of the oil wells use mineral gas for motive power, but only within the past year has there been any serious effort made to employ gas for domestic and industrial purposes in the town of Bakersfield. From recent industrial undertakings and developments indications are that Bakersfield will very largely profit by the practical application of mineral gas for heating, and lighting, and industrial uses.

The Santa Maria field is one of the richest in natural gas resources in the State. Natural gas is pumped through four-inch pipes to the town of Santa Maria, and used chiefly for fuel purposes, as the town has an electric lighting plant.

There is hardly an oil field in California that does not produce natural mineral gas and employ it regularly for the generation of steam power or for direct power, and for lighting, heating, and cooking. Direct gas-power engines are employed chiefly for oil pumping, but can be and are used for drilling wells, with economic results so far as the cost of fuel is concerned, but they are not economic in the matter of time.

The possibilities of mineral gas production in the State are beyond computation, but the probability of a more extensive use of this important natural product rests entirely with the demand that may come when its economic utility has been thoroughly and practically demonstrated.

The chief producers of natural gas for industrial and domestic use are Santa Barbara, Solano, San Joaquin, Sacramento, and Ventura counties. In 1908 Santa Barbara County produced 715,612 thousand cubic feet; San Joaquin, 60,903; Sacramento, 55,000; Solano, 7,743, and Ventura 3,625. And these are about the relative productions of the several counties for the year 1909.

Progressive Operation.

The first record of the actual physical discovery of oil and gas in California dates back to 1838, at Half Moon Bay. The discovery was

accidental, and resulted from an explosion of gas caused by a campfire lighted by Franciscan missionaries. It was nearly twenty years after this that Andrea Pico (1856) found oil in Pico Cañon, and distilled it. With this production he supplied the San Fernando Mission. In 1856 and 1857 a San Francisco man operated on what was known as Brea ranch, near Los Angeles. Eight years later a light oil was found in Mattole Creek, Humboldt County, and sixty casks or drums containing about twenty gallons each were shipped to San Francisco. Some of this oil was burned for illuminating purposes, without being distilled or refined. A considerable quantity of oil was also shipped in the same year, 1865, to San Francisco from Tulare County, where there were several companies operating. In fact, throughout the State, from Tulare to Humboldt, and including Santa Cruz County, there were in 1865–66 some sixty-five oil companies operating, having issued an aggregate capital stock of $45,000,000.

There was considerable prospecting for oil in Contra Costa County in the Miner ranch field and vicinity from 1864 to 1900. A green oil of high gravity, which pumped fifteen barrels, was found in one of the wells at a depth of 300 feet. About twenty wells were driven in this district, at depths ranging from 100 to 500 feet, while one reached a depth of 2,750 feet, but none of them ever proved commercially profitable. While the existence of a lighter fluid petroleum in sufficient quantity for practical use in a small way was known as early as 1856, and operated quite extensively for several years, the fuel value of California petroleum was not actually comprehended until about 1884. At that time the operators were going deeper into the earth and finding that the oil was held in pools, that it was of heavy gravity and asphalt base.

In the first State Mining Bureau report, which was for the year ending June, 1884, there was presented a brief description of operations in Los Angeles County, Moody Gulch in Santa Clara County, and Tunitas Creek in San Mateo County. In that year one company had sixteen producing wells in Pico Cañon, some of which yielded seventy-five barrels per day each. These wells were driven to a depth of 1,000 to 1,900 feet. The impractical and primitive operation in Pico Cañon was done in 1875, when three shallow wells were drilled with spring-poles. These wells yielded oil at depths of 90 to 250 feet. Practical development with steam power machinery was begun in 1877, and about that time a refinery was erected at Alameda Point, at a cost of $160,000, for the treatment of the product of Pico Cañon, and some other districts. Up to 1884 Moody Gulch in Santa Clara County had produced about 24,000 barrels, and in that year Pico Cañon was producing an average of 560 barrels per day. The production of petroleum in California had decreased importation about 33⅓ per cent, and exports were

being made to British Columbia, the Sandwich Islands, the Society Islands, and Mexico. Crude oil from Pico Cañon district was shipped to San Francisco, Los Angeles, Colton, and Arizona. It was used at Colton as fuel in the burning of lime, and at Los Angeles as fuel for the electric light works, and for burning brick. The refined oil was chiefly confined to local use in the southern part of California and Arizona.

The seventh annual report of the State Mining Bureau for the year ending October, 1887, contained a report on the petroleums, asphaltums, and natural gas, chiefly in the counties south of the bay of San Francisco; there were other contributions to the petroleum and asphalt industries in the next preceding years, but the first bulletin issued by the State Mining Bureau on Petroleum was in 1894, and known as Bulletin No. 3, Gas and Petroleum Yielding Formations of California. In 1896 another bulletin, No. 11, Oil and Gas Yielding Formations of Los Angeles, Ventura, and Santa Barbara Counties, was issued. The next was Bulletin No. 16, the Genesis of Petroleum and Asphaltum in California, issued in 1899. In 1900, Bulletin No. 19, Oil and Gas Yielding Formations of California, was issued by the Bureau. In 1904, Bulletin No. 32, Production and Use of Petroleum in California, appeared, and in the fall of 1910 the State Mining Bureau had in course of completion Bulletin No. 61, on Petroleum in California.

Characteristics of Various Fields.

Professor Whitney, the second State Geologist of California, in his report on the geology of the State, in November, 1865, expressed quite a positive opinion that the bituminous formation of the southern half of the State would not produce liquid petroleum in profitably commercial quantities. As the bituminous shales everywhere south of the bay of Monterey were turned up on edge and had no cover of impervious rock, Professor Whitney declared the inference was unavoidable that flowing wells delivering a considerable quantity of liquid petroleum could not be expected to be got by boring to any depth. If Professor Whitney could have lived to see some of the gushers and flowing wells in the various petroleum districts of the State south of Monterey Bay and comprehend the magnitude of the petroleum industry in California for the past ten years or more, he would probably be surprised and possibly convinced of his error.

Mr. S. F. Peckham, one of the geologists of Professor Whitney's survey, disagreed with his chief, and in 1866 he declared that in the southern portion of the State there were veritable oil interests that only needed the fostering care of men of sound judgment, aided by sufficient means, to enable this section to ultimately furnish the entire Pacific coast

with both illuminating and lubricating oil at a price that would render futile all competition of Eastern producers. Mr. Peckham was a wise prophet, but even he did not comprehend the magnitude of the asphaltum oil possibilities.

Mr. Peckham stated that to speak seriously of the oil interest of southern California at that time drew forth from the majority of the citizens of the State a smile of incredulity or ridicule, and that to urge their claim for consideration as a field for profitable investment presented strong reasons for doubting one's sanity. About that time J. Ross Browne, first Federal mining commissioner, said that he was undecided whether to take sides with either the oil party or the no-oil party.

The topography and geological formation and the depth of the wells in the most important petroleum-producing counties are set forth by Mr. Paul W. Prutzman of the State Mining Bureau, in a concise and comprehensive tabulation, presented in an advance chapter from Mineral Resources of the United States, issued in 1903 by the United States Geological Survey. The counties embraced in this description are: Santa Cruz, Fresno, Kern, Santa Barbara, Los Angeles, Ventura, and Orange.

In Sargent district, Santa Cruz County, the surface is described as rolling grass-covered hills, with some soil overlaying shale and sandstone; the maximum depth of wells 1,000 feet, minimum 600.

The surface in the Coalinga district, Fresno County, varies from rocky hills to rolling and barren hills, while the formation is shale and sandstone and dry sand; the maximum depth of wells in 1903 was from 1,800 to 2,260 feet, minimum 450 to 550 feet; in 1909 the maximum depth more than 4,000 feet.

Kern River district in Kern County is similar in topography to southwestern Fresno County, but the formation changes to clay and sand. In Sunset and Midway the formation is shale and sand. In McKittrick, shale and quicksand. The surface varies from rocky to rolling, barren hills; the maximum depth of wells in 1903 was McKittrick 2,000 feet, Midway 1,500, Kern River 1,200, and Sunset 1,100. The minimum varied from 780 feet in Midway to 400 feet in McKittrick.

In Santa Barbara County there are two districts, wholly dissimilar. The Carreaga is composed of rolling, grassy hills (the geological formation of which is not given). The depth of the wells in this district is given at 2,400 feet, maximum, and an average of 2,000 feet. The Summerland district is situated on the ocean beach, south of Santa Barbara. The formation, which is the shore bank and the bed of the ocean beach, is composed of clay and sand. The average depth of the wells is 250 feet; the maximum 600 feet, and the minimum 150 feet. These wells



MARICOPA DISTRICT, MIDWAY OIL FIELDS, KERN COUNTY

are drilled and pumped at points extending 50 to 2,000 feet across the surface of the ocean, the derricks being surrounded by level platforms that correspond in elevation to the surface at high tide line on the shore, or to the shore bank.

Los Angeles County includes three districts besides what is known as the Los Angeles city district. At Newhall, the topography is of rough, rocky hills, and the formation sandstone, shale, conglomerate, and crystalline rocks; maximum depth of wells 1,950 feet, minimum 400 feet. In Whittier and Puente districts the formation is shale; the maximum depth of wells of Whittier is 2,200 feet, minimum 285 feet, average 1,250 feet. The maximum depth at Puente is 2,000 feet, minimum 1,000.

The surface in Los Angeles city field is low and undulating; the formation clay, sand, and shale; maximum depth of wells 1,300 feet, minimum 500.

The topography of the Ventura district is rough and rocky, the formation sandstone, shale and conglomerates; maximum depth of wells 2,100 feet, average depth 1,000 feet, minimum 90 feet.

In Orange County the Fullerton district is composed of rolling hills, and the formation shale and sandstone; maximum depth of wells 1,875 feet, minimum 400.

The most recent contributions to the geology, the resources, and the economic conditions of the oil fields of California are Bulletins 398 and 406 of the United States Geological Survey, issued in 1910. Bulletin 398 describes the geology and mineral resources of the Coalinga district, and is written by Mr. Ralph Arnold and Mr. Robert Anderson.

Coalinga district is described as a strip of land about fifty miles in length by fifteen miles in width, along the northeastern base of the Diablo Range, on the southwest side of the San Joaquin Valley in western Fresno and Kings counties. Briefly, the rocks of this region are described as chiefly mineral, sedimentary strata of Cretaceous and Tertiary age, which have been subjected to much disturbance, but are in large part only slightly consolidated.

Two types of oil, paraffin and asphalt, originate in Coalinga district, varying from black oil of 14 to 15 degrees to greenish oil of 35 degrees Baumé. The yield ranges from three or four to 3,000 barrels per well, per day. The vertical depth of the possible productive territory is calculated at 4,500 feet. The wells already drilled vary from 600 to 4,000 feet.

The writers of the bulletin expressed the opinion that the Coalinga district would continue to be the greatest in California, if every operator will conserve to the utmost the supply of oil at present estimated to be available. This available quantity is approximated at 2,737,000,000 barrels. The estimate is held to be merely an approximation reached by assuming a 10 per cent impregnation of the oil sands, and calculating

from all the data available the probable thickness of sand under each quarter section.

The earliest recorded production in the Coalinga field by the Geological Survey is 1897, showing 70,140 barrels. For 1909 the bulletin estimated that the probable production would be 15,200,000 barrels, but that is about 200,000 barrels less than the actual production was found to be. This gives the total production of the field for the thirteen years approximately 63,000,000 barrels.

The McKittrick-Sunset oil region is described in Bulletin 406 as being within or along the northeast edge of the Coast Range, adjacent to the great interior San Joaquin Valley, comprising the southmost part of the Diablo and Temblor ranges, the Buena Vista and Elk Hills, the Caliente Range, and the Carrizo Plain; the region occupies about 1,800 square miles; is about 75 miles in length, and 30 miles in width. The developed oil territory, known as the McKittrick, Midway, Sunset, Temblor and Devils Den districts, lies along the northeast flanks of the Temblor and Diablo ranges; the Carrizo Plain district is along the southwest flank of the Temblor range, adjacent to the Carrizo Plain. A railroad line connects McKittrick with Bakersfield, and another connects Fellows, Midoil, Moron, Monarch, and Hazleton with Bakersfield; other sections are reached by wagon road.

The oil in McKittrick field is black to brownish in color, and varies from 12.5 degrees to 24 degrees Baumé. Gas usually accompanies the oil. The individual well production varies from 2 to 1,500 barrels per day, the latter being unusually prolific.

The Midway field is defined in the report as a belt of territory along the eastern base of the Temblor Range, extending in a southeasterly direction. Less regularity marks the occurrences of oil sands in the Midway field than in any other in the San Joaquin Valley so far examined by them. The oil varies from black to brown in color, and from about 11 to 12 degrees, and 20 to 22 degrees Baumé. The heavier oil comes from the shallower wells; the lighter oil from the deeper wells. Gas accompanies oil in all the wells, but not under the strong pressure that affects the Sunset field, except in a few near the axes of the anticline.

The hydrocarbon productions of the Sunset field consist of heavy tar or gas, and oil varying from 11 to 20 degrees Baumé. The tar occurs in springs along the outcroppings of the oil sand in certain exposures of the shales in the southeastern part of the field, in some of the wells. The oil is black and very viscous. The heavier oil is 12 to 13 degrees Baumé; the lighter oil is 13.5 to 20 degrees Baumé. The latter is produced by the deeper wells, especially in the northern part of the field. There are moderate quantities of 16 to 18 gravity in some of the shales and fine sands.

The depth of the Sunset field wells varies from 350 to more than 1,900 feet. The standard rig is the usual method of drilling which has been aided by innovation in the drilling through cobble beds with the use of dynamite.

The Devils Den district lies near the north line of Kern County, extending east and south from the Diablo Range, and north of Antelope Valley. The gravity of the oil is about 23 degrees Baumé; the underlying coarser sand yielding heavier oil or tar.

The Temblor field is northwest of the McKittrick, occupying low hills and extending as far as the Carneros Springs. The surface outcropping is about 200 to 400 feet thick. The sand is traced by tar springs and asphalt deposits. The wells have a depth of 250 to 535 feet; the oil-sand being reached at from 200 to 400 feet, and has been penetrated 24 to 100 feet. The oil is black and of a gravity of 14 to 20 degrees Baumé; the production varies from 2 or 3 to 60 barrels per day.

The Carrizo Plain field embraces the Carrizo and Elkhorn plains and the adjacent southwest flank of the Temblor Range. No commercially productive wells have been drilled, although the small quantities that have been obtained are of about 28 degrees Baumé gravity; the color is brownish to greenish, with small viscosity.

Bulletin 406 contains also a list of lands classified as oil lands within the McKittrick-Sunset region.

A recent reliable record of gravity of the crude product in the principal fields is here reproduced: Kern, 12 to 15 degrees Baumé; Midway, 14 to 25; Coalinga, 14 to 34; Pico, 14 to 34; Santa Maria, 20 to 28.

Cost of Drilling.

While the output of oil in the various California fields had for the twenty years ending with 1885 amounted in value to nearly $1,250,000, there had been no great improvement in the method of boring until about 1884, when the Standard rig was introduced in this State. Previous to that time tunnels and shafts and open cuts had been adopted as methods for reaching the oil, although there was some drilling with the old spring-pole method. In 1884 and 1885, and since that time, the Standard drill has been in operation, and the method of drilling has been constantly improved. Several years ago the Rotary rig was introduced, although no considerable effort was made with that method of drilling until 1908. In that year this drill had been proven successful in the Texas fields, and was then practically introduced in California. In the past two years they have been successfully introduced in every field in the State, although chiefly employed in the Coalinga, Midway, Maricopa, and the Salt Lake fields. The drilling with Rotary rig is rather expensive, for the reason that it is actually done with the pipe,

and considerable damage results from the rotating of the pipe. Men who operate the Rotary drill will contract to drive wells at a depth of 2,500 feet for $3.50 per foot. This price covers only the labor, and does not include any material. Some of the best authorities regarding the employment of the Rotary rig state that it is impossible to give an accurate average cost of drilling with the Rotary; that is to say, the whole cost including the labor and material. The history of the Rotary dates back nearly twenty years, and was probably first used in Michigan for drilling water wells. The next fields into which it was successfully introduced were the Louisiana, the Texas, and then the California. This method of drilling was also used in Russia, in the Dutch East Indies, and in Mexico. There are formations in this State, especially Maricopa and Midway, in which the Rotary works successfully. This rig may be employed to an average depth of 2,000 feet, but usually it is advisable to use the Standard rig below that depth; although in Texas and Louisiana wells to a depth of 3,000 and 4,000 feet are successfully drilled with the Rotary.

Wells averaging in depth from 1,000 to 1,500 feet are drilled with the Standard rig for from $6 to $8 per foot. The minimum cost is about $6, while the maximum cost may reach $20 per foot.

There are in this State, at present drilling, about seven hundred Standard rigs, and about fifty Rotary rigs. Considering that the Rotary was not successfully introduced until two years ago, the employment of fifty of them in the fall of 1910 was considered to indicate the progress in the use of this method.

A notable demonstration of the capability of the Rotary rig is of record in Coalinga field. A well that had been driven to a depth of 3,250 feet with the Rotary was considered as deep as that method of drilling could be made practicable, and it was decided to continue the work with a Standard. At the time the use of the Rotary was dispensed with there were 2,350 feet of 10-inch casing in the hole. The purpose then was to complete the casing of the balance of the hole with a Standard rig, and also to drill into the oil sand with Standard tools. But the well gave the drillers a great deal of trouble, and the operation has been changed back to the Rotary, which in October, 1910, had continued the well to about 3,300 feet. The operation was being watched with a great deal of interest by men who are driving wells in the deep territory in that section. As the Rotary rig has proven a greater capability than was credited to it a year ago, the possibilities of its use are still looked for as extending beyond the present results.

It is impossible to give definite and accurate information as to the cost of drilling wells in California, but a conservative figure for the Standard rig may be set down as an average of $10 per foot for drilling of wells from 2,000 to 3,000 feet in depth. This cost includes the com-

pletion of the well, including all material, and actually putting the well on the beam for pumping.

General Uses of Oil Fuel.

In the early use of petroleum as a fuel in California there was experienced by the producers an occasional difficulty in attracting manufacturers to a permanent adoption of oil fuel. The opinion was somewhat prevalent even in the early nineties that the supply would not be equal to the demand provided all manufacturers adopted its use, and particularly did this opinion obtain from the fact that the railroads and steamships seemed rather slow in making the changes essential to the substitution of oil fuel for coal fuel. There was a campaign of education in progress during almost the entire decade of the nineties. The production of oil increased steadily each year, and gradually the manufacturers, both large and small, remodeled their furnaces and adopted petroleum as a permanent fuel in substitution for coal. When the railroads and steamships in 1900–1902 decided to permanently adopt oil fuel, and it was generally believed that the supply would continue to increase, the demand for oil fuel was so great that there was considerable difficulty experienced, even as late as 1905 and 1906, in obtaining delivery of oil that had been contracted for.

The use of oil fuel in manufacturing industries has since that time been adopted in almost every plant, from the big ship-building establishments to the ordinary bakery; and even for domestic purposes, for cooking in hotels and private houses, there are many instances of the substitution of oil rather than gas for coal.

The heavy oils direct from the field are commonly used for the heavier work of large manufacturers, while a distillate that comes from the refineries is generally used by smaller concerns which employ small engines, and for furnaces for hotels; also the hotels and apartment houses use a distillate for heating purposes. The oil heater has not been generally adopted in the home. There have been so many other uses for oil, and the time and attention of inventors and manufacturers have been so generally taken up in the meeting of the demands for burners employed in manufacturing establishments that the small heater for home use has not advanced to meet all the requirements of that character of apparatus.

It would be difficult to enumerate all the various manufacturing industries which employ oil fuel. Its use extends into almost every section of the country, and to Panama, Alaska, and Hawaii. About one half million barrels of California fuel oil is used on the Panama Canal in a year. The mines in Alaska are large users of California petroleum; the sugar plantations in the Hawaiian Islands use oil fuel for power, and a large number of great and small manufactories along the Pacific

coast to the north, Portland, Tacoma, Seattle, and interior towns are large users of oil fuel. An extensive paper manufacturing plant on the Willamette River has found oil fuel more economical than the refuse wood from the sawmills. The use of petroleum is not confined, of course, to the coast, but extends into all parts of the interior of California, Nevada, and Arizona. Stamp mills and smelters are large users of this fuel, and the big copper mines not only in this State but in Arizona are among the larger establishments that depend upon California for fuel.

The use of gasolene in automobile service has very largely increased in the past five years, as the number of automobiles has been augmented by thousands of new machines on the coast. Formerly California and some other coast states and territories depended upon Eastern gasolene for general purposes, but for about ten years the gasolene products of the refineries of California have supplied most of the general demand. The great quantity of high gravity crude petroleum in many of the fields of California has long attracted the refiners to the possibilities of production not only of gasolene, but of other refined oils, and many of the markets of foreign ports, as well as Pacific coast states and territories, have been and are being supplied with California products. The markets for fuel oil also have extended to foreign ports.

The Panama Canal operation used 300,000 barrels of California fuel oil in 1908. The demand for 1909 was increased to 500,000 barrels. The oil is shipped by tank steamer from the fields to the west coast of Panama, and thence delivered across the isthmus to the essential points by pipe-line constructed for this special delivery.

Gasolene and distillate are also largely used in the farming sections, and with the improvement of the internal combustion engine petroleum distillate is finding a field in the development of water for the purposes of irrigation and the generation of power for other farming requirements.

One of the general uses of fuel oil, which might be classed as special, is that of road work. In those parts of the State, where the delivery does not require extensive haulage, oil is very generally used in the finishing construction of county roads. In the southern part of the State oiled roads are very common, and many of the roads in the oil fields are finished with road oil. The fine driveways in Golden Gate Park, San Francisco, are constructed with oil for the top dressing, and they are among the best object lessons in this State of the practical, economic use of road oil.

One of the uses of oil for fuel, which approximated from 3,000,000 to 4,000,000 barrels in the past year, is in the drilling and pumping of the oil wells. The exact number of barrels of fuel so used is not obtainable and can here only be made approximate. The fields in the San

Joaquin Valley in October used 282,000 barrels for fuel purposes, which, for the valley alone, would approximate more than 3,000,000 barrels for the year. Besides this, there is consumed for fuel purposes, in the operation of oil wells, large quantities of the natural mineral gas which the wells themselves produce.

Oil Fuel in Railway Service.

The adoption of oil fuel for locomotive service on some of the branch railroads in California quickly followed the successful experiments and tests made in 1895 and 1896, and in 1900–1902 oil burners were permanently adopted on the main and branch lines of both transcontinental railway systems entering California.

The results of the early tests and experiments in both freight and passenger locomotives were recorded by Professor Watts in Bulletin No. 11, California State Mining Bureau.

Experiments extending over a period of six months showed as an average of results that four barrels of oil were equivalent to 2,200 pounds of Nanaimo coal. Experiments extending over sixteen days with a freight engine, 19 inch by 28 inch cylinders, gave an average result of evaporation of 13.11 pounds of water for each pound of coal consumed. The price of coal was $6.65 per 2,000 pounds, and the price of oil $1.35 per barrel. The saving effected by the use of oil represented 27.1 per cent; the gravity of the oil was 23 degrees Baumé. In January, 1896, oil fuel was used on twenty-five locomotives, being about equally divided between passenger and freight service, with the following showing: Distance traveled, 87,063 miles; average cost per mile for fuel, $.1439. The gravity of this oil was 15 degrees Baumé. During the same month of 1896 coal fuel was used on twenty-five locomotives, which performed practically the same work as the locomotives using oil. The average cost per mile for fuel used by the coal-burning locomotives was $.2320; the use of oil represented a saving of 37.975 per cent over coal.

During the year 1896 the cost of coal was $6.60 per 2,000 pounds; the cost of oil, $6.03 for 2,000 pounds. In Mr. Watts' record he shows that during December, 1895, one of the overland passenger engines, 19 inch by 26 inch cylinder, was run 7,347 miles, and consumed 143.2 tons of oil. A similar service with coal required 294 tons. Oil at $6.03 and coal at $6.60 showed a relative cost of oil $863.50, and coal $1,940.40, a saving of $1,076.90, which equaled about 55.5 per cent. The approximate cost per mile for oil was $.1175; for coal, $.2641.

In the year 1910 the three transcontinental railroads entering California were burning California oil fuel in locomotive service on all lines operating in Pacific Coast States. The aggregate number of oil-fired locomotives approximated about 1,500. Of this total there were, in round numbers, about 600 employed in passenger service, 700 in

freight service, and about 200 switch engines. These 1,500 locomotives consumed a total average of about 1,000,000 barrels of oil per month.

The average cost of locomotive fuel oil of about 15.8 degrees Baumé mean gravity for the five years, 1906 to 1910, inclusive, was approximately $.43 per barrel. The maximum cost in that period was about $.54, the minimum cost about $.34. In locomotive service, with the present use of oil, four barrels are said to be equal in efficiency to 2,000 pounds of bituminous coal. This covers certain losses, and when reduced to a percentage, based on tests made in 1904–1909, is represented approximately by 9 per cent, tests being in the same class of locomotive service. The calorific values of oil and coal in locomotive service are the same as in marine service, 18,500 B. T. U. per pound of oil compared with 13,337 B. T. U. per pound of coal.

In the locomotive service the saving is not so great in the use of oil fuel, as compared with coal, as in the marine service, for the reason that there is no appreciable reduction in the cost of firing the locomotive with oil, while in the steamship service the saving in cost of labor is a very considerable item.

The use of oil fuel in railway service is not confined to locomotive engines; it is applied also to the generation of power operating many of the electric lines in California. There are some electric lines for which electricity is generated by water power, but in most instances the generation is by oil fuel. Among the earliest experiments with oil for the generation of electricity in the operation of street and suburban railways, one is recorded in Bulletin No. 11 of the State Mining Bureau (1896), which extended over a period of ten days, averaging nineteen hours per day. This test showed that 2,957 gallons of oil of 24 degrees Baumé equaled in fuel value 19.41 tons of Wellington coal. There have been various other tests made in the practical application of oil for fuel in power houses since that time, and the price of oil is somewhat lower than it was fifteen years ago, and there have been various improvements in oil-burning furnaces. Actual comparisons are not obtainable at this time, for the reason that power houses now using oil fuel do not use it as an auxiliary, but as a substitute.

The use of California oil fuel in locomotive service is not confined to the transcontinental and local lines that enter this State, but is employed on some of the northern roads, and recently the contract is said to have been made with California producers to deliver oil for fuel use on Canadian railroad lines, and also for their steamer service. In fact, the use of California oil is rapidly extending east and north, wherever the distance and charges of transportation are not prohibitive.

Oil Fuel for Bay, River, and Ocean.

The use of California oil fuel for generation of steam in the propulsion of bay and river vessels was first permanently established in 1901, and since that time has been generally adopted by all manner of craft from tug boats and coastwise lumber schooners, passenger and freight steamers, to the biggest ocean-going vessels sailing between Pacific coast ports and the Orient, and the Atlantic seaboard.

The first practical tests and experiments made in the use of California crude petroleum as marine fuel were in 1885. At that time the annual production of crude petroleum in California was less than one half million barrels. The production in 1884 was 262,000, which was increased the following year to 325,000 barrels.

Even in these early experiments the saving in cost by the substitution of oil for coal fuel was 18 per cent to 22 per cent per annum. These tests and experiments were continued into the years 1886 and 1887. The following details regarding one of the largest ferry steamers engaged in a trial of oil fuel are here recited. A test was first made with coal in May, June, July, and August, 1885; during which period there were consumed 2,467 tons of coal, at a cost of $13,368.45. The steamer ran in the four months 17,843 miles at a cost per mile for (coal) fuel of $.7492. Oil was used in October, November, and December, 1885, and January, 1886. The consumption was 31,879 gallons of oil, at a cost of $12,845.04. The number of firemen was reduced from eleven to six. In these four months this steamer ran 17,275 miles, being 568 miles less than the run with coal. The cost per mile for (oil) fuel was $.7435.

The same steamer continued in the regular service, and since 1901 has burned oil exclusively. A recent record shows that the cost of oil fuel per mile has been reduced from $.7435, in 1886, to $.3483, in 1910. This reduction does not indicate solely a reduction in the price of oil, but is largely attributed to changes in the general arrangement of fireboxes and the improvement and location of the burners.

The approximate average cost of oil fuel for bay and river vessels, for the ten years from 1901 to 1910, inclusive, was $.458 per barrel. But there was a period in that ten years when the price was as low as $.30, while the maximum price was $.75. The oil used for marine fuel purposes has an average mean gravity of 15.8 degrees Baumé. The average relative efficiency of oil to coal in bay and river services is 3.48 barrels of oil to 2,000 pounds of bituminous coal.

The smaller crafts, such as tugs and launches, use a distillate which is of a higher gravity than the ordinary steamer fuel, and some use gasolene. But there is scarcely a vessel on the bay that does not burn oil fuel of some character. Only in cases where coal mines may be a part of the assets of large steamship operators will coal be found as a fuel on the Pacific coast in the propulsion of steam vessels.

There are about 450 vessels plying in and out of San Francisco Bay and Pacific coast points that burn California oil fuel. The total tonnage of these vessels is about 300,000. With the exception of two companies, one an ocean-going and the other a coast line company, all steamships, steamboats, steam schooners, and ferries of importance use oil fuel for the generation of steam. In fact, 90 per cent of all the shipping in and out of San Francisco Bay burns oil fuel, and about 15 per cent of the vessels plying along the north Pacific coast, including Puget Sound. The use of oil in river craft extends to the Yukon in Alaska, these steamers being supplied from storage stations at St. Michaels. San Francisco is the only point where the general use of oil fuel in steamship and steamboat practice has been established; and this not for the reason that oil can not be supplied, but for the reason that a successful installation of plants has not yet been accomplished. The installation of oil-burning plants on the bay, rivers, and ocean on this coast is under the jurisdiction of the Supervisor of Inspection of Steamboats in the United States Department of Commerce and Labor, which has a branch office in the city of San Francisco.

The big marketing concerns supplying the coastwise and ocean-going vessels with oil fuel have stations at San Francisco, Los Angeles, Seattle, Portland, Honolulu, St. Michaels, and Manila, which are provided with California oil.

One of the largest oil-fired ocean-going ships plying between this coast and the Orient, of 21,650 tons displacement, arrived in San Francisco July, 1908, on her maiden trip from Hongkong, burning California oil. The ship was fitted with 13 boilers, having 48 burners in action under 12 boilers, making an average speed of 20 knots. Running from Honolulu against head winds, the ship made 18.25 knots per hour with 12 boilers in action, and burned about 1,400 barrels of oil per 24 hours. The oil tanks were built within the ship and so constructed as to be readily rearranged for carrying coal fuel, if necessary, having a capacity for about 21,000 barrels of oil.

Oil Fuel Tests by United States Navy Department.

The most important contribution to the knowledge of the uses of oil fuel in the United States Navy was made in a volume of four hundred pages, issued by the Navy Department in August, 1904, and containing the report of Rear-Admiral Geo. W. Melville, Engineer in Chief of the Bureau of Steam Engineering, under the caption of Naval Liquid Fuel Report. For the purposes of experimental tests the fuel board of the bureau worked in conjunction with a board whose duty it was to experiment respecting boiler efficiency. Prior to the undertaking of the tests of liquid fuel the board occupied some ten months, from April, 1901, to January, 1902, in making seventeen

tests with coal fuel. On these coal fuel tests was based a comparison between coal and oil fuels.

The oil-fuel tests were begun in June, 1902, and concluded in June, 1903, and numbered sixty-nine. The report of the board was submitted to the bureau and approved by the Engineer in Chief in August, 1903. The board found that the relative evaporative efficiency of oil and coal as fuel, as determined by this extended series of comparative experiments, to be practically in the direct proportion of 15 to 10. Considering the superior quality of coal that was used, and that the coal tests were of comparatively short duration, and that the oil experiments were carried on under conditions more closely to those that could be secured on board a sea-going vessel, the actual evaporative efficiency of a pound of oil as compared with a pound of coal was found to be in the ratio of 17 to 10. The board further considered the economic structural advantage in favor of carrying oil and thus added one point to the ratio of efficiency, making it 18 to 10.

All of the data reported to the bureau was observed either by draughtsmen connected with the Bureau of Steam Engineering, or by the enlisted personnel of the United States torpedo boat Rodgers. For ten months this torpedo boat was continuously in the service of the Liquid Fuel Board, so that the experiments were not made without opportunity for practical application upon sea-going vessels.

In addition to the experiments on the torpedo boat, the oil-fuel installations of several ocean-going steamers were carefully examined under actual working conditions; also the installations projected by various promoters were critically inspected, and the operation of installations of various patented oil-fuel devices were reported upon. In addition to these observations, the board had opportunity to observe the relation of oil and coal-burning locomotives in the Hoosac tunnel. In June, 1902, tests and observations were made by Lieutenant Winchell on the steamer Mariposa, equipped with oil-burning device, on the run between San Francisco and Tahiti. The report of Lieutenant Winchell was made directly to the Bureau of Steam Engineering, but included in the experiments. There were nine burners employed, reprecussed.

The sixty-nine liquid fuel tests made by the board, included various points of duration from three hours to eight hours, and also an endurance test of one hundred and sixteen hours. The burners employed were both air and steam, while both forced and natural drafts were included in the experiments. There were nine burners employed, representing practically all of the available burners built upon fundamental principles at that time. Besides the air and the steam devices, several experiments were made also with mechanical burners, demonstrating that oil may be used as fuel in marine firing without the use of

either air or steam; but these experiments did not extend to that degree to which the board had desired, because so few of this type of burners were then available. The report urged the necessity for mechanical burners for the reason that the direct action of steam entails a corresponding loss of fresh water, and that in the use of compressed air the introduction of air compressors encroach upon the weight and space allowed for installation of machinery and requires considerable additional expense for up-keep and repairs, besides the horse-power required to operate compressors.

The oils used in these experiments were from California and Beaumont and the Gulf-Texas fields. They were crude oils submitted to light distillation. The board inclined to the use of crude oil for the reason that from the standpoint of volume it is held that the highest evaporative results ought to be secured with the heaviest oils.

The report contains a record of observations made of the installation of an oil-burning device on the steamship Nebraskan, and the economic results reported by the officers of the ship. The Nebraskan left New York August 7, 1902, for San Diego, California, touching at the ports of St. Lucia, British West Indies, and Coronel, Chile, for coal. The whole distance traveled was 13,280 miles, accomplished in 57 days 5 hours and 43 minutes, burning 2,267 tons of coal of poor quality, and employing a fireroom crew of fifteen men. The ship was kept at full speed during the entire voyage. The return voyage from San Diego to New York was made with oil-fuel, in 52 days 7 hours 26 minutes, and the mileage reduced to 12,760, as the ship was not required to put into port for fuel. Four hundred and fifty-seven tons of measured cargo space was saved by the substitution of oil-fuel for coal, and the fireroom crew was reduced to six men. Including the difference in the cost of fuel, cost of firing and the gain in cargo space, and the saving of five days' time, the resulting financial gain to the company was at the rate of $500 per day. The insurance risks on vessel and cargo were not increased with the installation of oil-burning appliances.

The report states that the mechanical or engineering features of the oil-fuel problem were practically solved; that the financial feature should not be regarded as of serious importance, but that the structural, transportation, and supply features presented the only serious difficulties to the adoption of the use of liquid fuel by the navies of the world. The board held that in time of war when necessary to keep all reserve fuel afloat, then liquid fuel is at a disadvantage, because mining and railroad companies have invested so heavily in the coal industry and transportation has been so perfected that it is now possible to quickly deliver a cargo of coal at any point of the world. The question of oil supply for battleships and cruisers was considered to be not only a commercial affair but might prove to be a military problem requiring the

establishment of oil-fuel stations, necessitating a great expenditure and possibly involving the political question as to the wisdom of maintaining a complete chain of fuel stations.

As to the physical feature of the supply of oil, so far as the California field is concerned, it is a significant fact that there has been an enormous increase in the output of petroleum since these experiments were made by the Bureau of Steam Engineering. In the twelve months in which the experiments with liquid fuel were in actual operation, California produced, approximately, 19,183,370 barrels of crude oil. In a like period, covering twelve months in 1908 and 1909, the crude output in this State was 53,300,000 barrels, showing an increase in production of 34,116,630 barrels. During the period of ten months in which the board made the coal tests, from April, 1901, to January, 1902, the production of oil in California was only 7,321,942 barrels.

It is immaterial what the production of the Beaumont or the Gulf-Texas fields may be, as such figures would not change the relative situations materially. It is significant that the Navy Department began early in the practical productive history of fuel oil to investigate the possibility of applying oil-fuel to the propulsion of naval ships. It was expected that the productiveness of petroleum would greatly increase with development, and the Geological Survey had pointed out the probability of there being a large reserve, but at that time the prospect was not such as to encourage one to believe that within ten years the production of California would increase from about eight and three fourths million barrels to fifty-eight and one third million.

In view of the fact that at that time about 48 per cent of the world's output of crude petroleum was produced in the United States, and that practically the entire yield of this country is secured from fields which are in pipe-line communication with important maritime and strategic ports, the board recommended that a joint commission representing commercial, manufacturing, maritime, and naval interests should be organized by Congress, and suggested that particularly for the development of the commercial interests of the Gulf of Mexico and on the Pacific coast the work of such commission would have an important influence in extending the prestige and power of the United States, whether viewed from a commercial, maritime, or naval standpoint. The report adds that "The time may be nearer than now realized when the Navy Department may be called upon to suddenly equip auxiliary war vessels, if not fighting ships, with oil-burning devices. There would be a saving in both time and expense respecting such installation by continuing the investigation of the fuel oil problem along every line where new data might be procured."

Since the conclusion of the tests and experiments made by the Bureau of Steam Engineering, a number of torpedo boats and other naval

vessels have been fitted for the burning of oil, notably the United States battleship North Dakota, which was completed in 1910. This ship, in addition to the ordinary arrangement for burning coal, is fitted with a complete oil-fuel system; from storage tanks in the inner bottom the oil is pumped to settling tanks in the firerooms. From these tanks it is pumped under pressure through heaters to the burners. The system is comprised of eight oil storage compartments, having a total capacity of 105,898 gallons, or 2,521 barrels. Each boiler is furnished with six burners, arranged in three groups of two each between the furnace doors. The first naval vessel that was remodeled for the installation of an oil-burning system was the coast defense monitor Wyoming (now the Cheyenne). This ship was remodeled at Mare Island in June, 1908, and was fitted with self-cleaning automatic oil gas burners, with air compressors and steam connections. In the trial trip the test determined the operative capacity of the boilers and the percentage gained in efficiency operated with oil-fuel as compared with the efficiency when operated with coal-fuel. The percentage of gain in favor of oil was satisfactory and induced the installation of oil burners in other vessels of the Navy.

The American Society of Naval Engineers has devoted a good deal of attention to the discussion of the scientific and practical and economic uses of oil for fuel in the Navy, and in the *Journal*, published quarterly by that Society, there have been from time to time numerous valuable contributions (by members of the society, and others) to the knowledge of the naval uses of oil-fuel.

In the *Journal* of February, 1909, Lieutenant H. C. Dinger, U. S. N., presented a paper on the subject of "Oil Fuel for Naval Use," which discusses the various oil burners and their adaptability and efficiency, showing the relative efficiency of the air atomizer and the steam atomizer. He gives a list of some twenty ships, of displacement varying from 21,650 to 7,000, in which several systems of atomizing in the operation of oil burners have been installed, including both air and steam atomizers. In later installations there has been developed a system relying neither on steam nor high pressure air for securing evaporation. This mechanical oil-burning system has been successfully developed at various points of the world.

Within the past year numerous tests have been made by the United States Navy, and the efficiency and economy of oil-fuel have been quite thoroughly investigated, with the result that the Government has now been practically convinced in favor of oil as compared with coal, particularly for the Pacific service.

California Oil Refineries.

Oil has been refined in California since the date of its earliest practical discovery, when Andrea Pico supplied the illuminating oil in San Fernando Mission in 1856. Practical and economic refining on a commercial basis was begun in 1878 at Newhall, in the southern part of the State. The oil was supplied to this refinery by a small pipe-line from Pico Cañon. In the following year the company operating the Newhall plant erected another at Alameda, on San Francisco Bay. This refinery treated the oils from Pico Cañon and other districts. Other refineries were established, but until 1884 the production and refining of California petroleum was not conducted on a large scale. In that year the stills of the plant at Alameda had a total capacity of about 1,000 barrels. This refinery and one at Santa Paula, in Ventura County, were the only refineries of considerable importance operated in the State for the ten years following 1884. The Santa Paula plant was later removed to Rodeo, north of Oakland. In 1903 the refinery at Alameda was removed to Point Richmond.

In 1904 there were some 36 refineries in operation in the State, and in 1910 the number had increased to about 70, though not all of them were in successful operation. Of the whole number in operation in 1910, there were 46 engaged in the manufacture of asphalt besides other products of petroleum. These plants are located in the following named counties: Alameda, Contra Costa, Fresno, Kern, Los Angeles, San Francisco, San Bernardino, San Luis Obispo, Santa Barbara, San Joaquin, and Ventura. For ten years following 1894 the refining industry advanced, until there were 36 plants in 1904, operating about 146 stills, having an aggregate capacity of about 30,000 barrels. In 1909 the number had increased to about 44 refineries, having a total of 200 stills which had an aggregate capacity of approximately 70,000 barrels. Thus in five years the refining industry increased more than 250 per cent.

These refineries are of various sizes, from small plants of 2 to 6 stills, having a total capacity of about 50 barrels, up to the larger ones, of from 20 to 60 stills, having total capacities ranging from 5,000 to 50,000 barrels.

The gravity of the oils treated in these refineries varies from 34 degrees to 12 degrees Baumé. The heavier oils are employed in the production of asphalt, tar, coke, and road oil, while the products of the lighter oil include illuminating oil, gasoline, lubricants, residuum fuel, distillate, gas oil, and grease. The localities and fields from which the oils are obtained for the refineries are Kern River, Midway, Coalinga, Pico Cañon, Santa Maria, Los Angeles, Fullerton, Whittier, Sunset, Summerland, Ventura, Newhall, and Puente.

There is a large demand for all the products of the refineries, and the demand is not confined to local or domestic consumption, but reaches to foreign points. While in the earliest period of the development of petroleum in this State it was believed that only a light oil in small quantities could be obtained, the opinion afterwards prevailed that only a heavy fuel oil could be secured in commercial and profitable quantities. But since 35 per cent of the crude petroleum produced in the State goes through the refining process it is evident that California produces both fuel and refining oil in sufficient quantities to make the industry not only commercially profitable, but, at the present time, the leading mineral industry of the State.

The method of transportation of crude oils to the refineries is chiefly by pipe-line and tank vessels, although there are a large number of tank cars employed in the movement of oil that goes either direct to the refineries or to the pipe-line stations connected therewith.

California Oil Exports.

The exports of California crude petroleum for the fiscal year ending June 30, 1910, amounted to 1,394,254 barrels; in 1909 the amount was 554,506 barrels; in 1908, 326,000 barrels. Each of these years nearly 50 per cent of the shipments went to Panama. In the last fiscal year mentioned Panama received 532,609 barrels; Chile, 436,891 barrels; the balance was divided between Canada, Guatemala, Peru, Salvador, and Oceanica. The total value of the exports for this year was $670,954. In addition to the export trade 800,000 barrels were shipped to Honolulu and a large quantity to Alaska; including exports and off-coast points a total of approximately 2,250,000 barrels of crude oil were shipped in the fiscal year ending June, 1910.

The records of the custom house of San Francisco for the year 1910, from January to November, inclusive, show exports of crude oil, including fuel residuum, of 1,408,000 barrels, chiefly to Panama, Chile, and Peru. The shipments to Panama, amounting to 716,000 barrels, do not include the month of June. In the ten months in 1910, from January to October, inclusive, the shipments of crude oil to Hawaii amounted to 898,000 barrels. The shipments of crude oil to Alaska for nine months of 1910, from January to October, inclusive, but exclusive of June (in which no shipments were recorded), amounted to 349,619 barrels.

The products of the California refineries exported for the eleven months, from January to November, inclusive, 1910, amounted to 29,484,190 gallons (exclusive of residuum fuel to Chile and Peru). These products, as recorded by the customs house, included naphtha and the lighter products of distillation, illuminating oil, lubricating and heavy paraffine oils, and residuum, including tar. This amount does

not, of course, include shipments to Hawaii and Alaska. The products of the refineries shipped to Hawaii in the same period amounted to about 1,500,000 gallons. The latter represents chiefly lubricating and heavy paraffine oils. The shipments of refined products to Alaska are principally illuminating oil, which amounted in four months of the ten to nearly 50,000 gallons. The principal foreign markets for California refined oil are China and Japan.

Transportation and Storage of Oil.

The production of petroleum in California from about the year 1900 has advanced so rapidly that the transportation and storage of the crude product was for many years a very serious problem, not only with the producers and consumers, but with the transportation companies. In the present year, 1910, every producing district in the State is supplied with pipe-lines, having an aggregate length of about 1,470 miles and a total carrying capacity of 175,000 barrels in 24 hours. Besides these field pipe-lines, the large producing companies have trunk lines. These trunk lines extend from the principal fields to shipping points at tidewater, both on the coast and on San Francisco Bay. The systems of pipe-lines extend the entire length of the San Joaquin Valley, terminating at San Francisco Bay and Monterey Bay. Monterey Bay, west of the valley, is reached by pipe-line crossing the Coast Range northwest of Coalinga. The seaboard at Port San Luis due west of the valley, is also reached by pipe-line. The first trunk pipe-line was laid from the Kern River to Point Richmond, following the line of the Santa Fe railroad, in 1903. Other lines speedily followed, until the entire oil-producing region is employing this method of transportation. But the pipe-line service is not by any means the exclusive transportation service. Tank cars, having capacity of from 6,500 gallons to 13,000 gallons, have been in operation since 1900 and are very largely used at the present time, especially in the movement of oil to the interior points of consumption. In 1900–1902 there were about 100 to 200 tank cars brought from the East and put in operation, which numbers were doubled in the period of three years, from 1903 to 1906, and further increased as the oil industry advanced. These cars, however, do not represent the entire equipage, as some of the big producers and the transportation companies have added very largely to the number.

A large quantity of the crude production is moved by tank vessels, not only to coast points, but to non-contiguous territory and foreign ports. These tank vessels include steamers, schooners, barkentines, and barges, and have capacities varying from about 500 barrels to 60,000 barrels. The average capacity of tank steamers of the larger type varies from 40,000 to 60,000 barrels. The lesser type ranges from

5,000 to 20,000. There are about 30 of these tank vessels, of various sizes and types having a total aggregate capacity of more than 500,000 barrels.

The storage of crude petroleum is provided for generally by steel tankage and concrete and earthern reservoirs, of capacities varying from 25,000 to 1,000,000 barrels. The aggregate capacity of all this tankage exceeds 30,000,000 barrels. In the early fall of 1910 there were 29,000,000 barrels of oil held in storage, and this is an indication of the substantial and commodious provision that is made for the storage of production. This storage is equal to about one half the production of crude petroleum in the year 1909. The bringing in of numerous large gushers within the past year very seriously threatened the producers with a large loss, owing to the storage incapacity. In such cases earthen reservoirs were quickly constructed and the loss or waste of oil was very largely reduced within a short time after the wells began to flow. There is always an element of loss to be considered in the case of bringing in these large flowing wells, for the reason that it is not economy to prepare storage for an excessive output of petroleum when the existence of the oil has not been positively proven. But when the oil sand is passed and the oil is reached and is forced through the pipes in such quantity as to produce a gushing well, then the operators bear their loss until they can provide sufficient storage to take care of the enormous production.

On the whole, the California oil region is well supplied with both transportation and storage equipment, and the producers are generally sufficiently acquainted with the oil industry as to enable them to meet future demands that will follow still further increased production.

While the great gushers and large flowing wells have enormously, and sometimes suddenly, increased the production of crude petroleum, this increase does not constitute an overproduction, but a surplus which is essential to the provision for future demands of the markets. The improved methods have kept pace with the production, so that now many of the large flowing wells may be controlled and temporary or permanent storage quickly and economically provided. Thus the large production and the immense storage capacities provide an elasticity in the conduct of the industry and marketing of oil, and places the State in a safe position should there come a sudden and very large demand for oil-fuel. The question of reserve has been satisfactorily settled by very careful geological survey, so that, so far as the productive capacity of the oil regions is concerned, there need be no fear.

LUMBER INDUSTRY

California has produced in the past fifty years, approximately, 11,000,000,000 feet of redwood lumber, or an average of about 220,000,000 feet a year. In the past seven years the average annual output has been nearly 400,000,000 feet. The output of all kinds of lumber produced in California, as reported to the California Development Board, increased from 251,739,953 feet in 1881 to 581,448,895 feet in 1899. From that time to 1909 there was an approximate constant increase, with the exception of the year 1906, the year of the San Francisco fire, during which period the demand, of course, decreased on account of the inability to proceed on a large scale with the rebuilding in that year. But even in the face of that disaster and the decrease in demand, the production of lumber for 1906 was 544,013,798 feet. The two big years in the present decade were 1903, when the production reached 852,638,197 feet, and 1908, when the production was 828,602,000 feet. The Federal Government report of the various kinds of lumber cut in California in 1908 shows 996,115,000 feet, the value of which was $15,211,055. In this report of the Government, redwood and western pine amounted to 72 per cent of the whole production for the year. Of these two varieties redwood produced 404,802,000 feet; western pine, 318,406,000 feet. Total output of all kinds of lumber for eleven years from 1899 to 1909, inclusive, was approximately 7,500,000,000 feet.

Notwithstanding this immense production of lumber from the forests of California, there still remains a forest area of approximately 65,000,000 acres. The Forest Service of the United States Department of Agriculture reports, under date of September, 1910, 28,103,128 acres held by the Federal Government in twenty-one forest districts in California. In December, 1909, the area was 27,968,510, in twenty forest districts, being an increase of 134,618 acres in the year. The names of the twenty-one forests or districts reported by the Federal Government in September, 1910, are Angeles, California, Cleveland, Crater, El Dorado, Inyo, Kern, Klamath, Lassen, Modoc, Mono, Monterey, Plumas, Santa Barbara, Sequoia, Shasta, Sierra, Siskiyou, Stanislaus, Tahoe, and Trinity.

Since the establishment of the State Board of Forestry by the Legislature in 1905 there has been coöperation between the State and the

Federal Government in much of the work of preservation of the California forests, particularly in the prevention and stopping of forest fires. Under the law permitting the employment of firewardens, there were, in 1908, 721 appointed by the State Board of Forestry. Of this number 269 were employed direct by the board, 128 were employed by thirteen counties, and 322 were volunteers. The volunteer firewardens receive no pay, and are given appointments in order to enable them to aid in the protection of their own or their employers' interests. By proper conservation, as is insisted upon by the Federal Government, and by careful and wise administration of the State Board of Forestry, there need be no fear of a lumber famine in California.

The total stumpage of the Northwest, including British Columbia, Washington, Idaho, Montana, Oregon, and California, has been estimated at more than 850 billion feet, and California is accredited with an estimated stumpage of 180 billion feet.

In the second report of the State Mining Bureau, for 1881-1882, attention was called to the necessity for conservation of the forest supply, and the Comstock lode in Nevada was cited as one of the big consumers of timber. In the twenty years that silver mining had been in operation, the Comstock had absorbed more than a thousand million feet, and that country from the Sierra Nevada to the Wasatch Range had used an equal quantity. Notwithstanding that California contributed very largely to the two billion feet of lumber consumed by Nevada mining and other industries, the encroachments on the California forests were not very perceptible. Except in the basin of the Truckee and about the shores of Lake Tahoe, the woods had been but little despoiled. In those localities about 2,000 acres had been thinned out, but there still remained, lying wholly to the east of the main summit of the Sierra, several million acres of forests, which had been but little invaded.

For the year 1881 the exports of lumber from California exceeded eighteen million feet. England took seven million, Mexico four million, and Hawaiian Islands and Australia were large importers. In Humboldt County alone in that year there was produced forty million cubic feet of lumber. In that day one million feet of redwood lumber per acre was by no means an extraordinary yield, and in some instances the produce has been as high as two million feet per acre, a single tree frequently yielding from 60,000 to 70,000 feet of lumber.

The second report of the State Mining Bureau contained also the following statement of the receipts of lumber at San Francisco for the years 1872 to 1881, inclusive, which included redwood, pine, spruce, cedar, and hardwoods:



Big Trees, Mariposa County.



Redwoods, Humboldt County

1872	232,214,817 feet
1873	198,568,331 feet
1874	248,147,559 feet
1875	300,009,193 feet
1876	304,624,821 feet
1877	297,892,522 feet
1878	258,711,465 feet
1879	227,085,293 feet
1880	214,385,365 feet
1881	251,739,953 feet

In addition to the statements and figures making up these totals, the record shows also the number of shingles, laths, shipknees, piles, posts, railroad ties, broom handles, spars, and other materials shipped. One of the considerable industries in that day, and which seemed to have diminished during that ten years, was the getting out of shipknees, the demand depending chiefly on the amount of ship-building carried on at San Francisco.

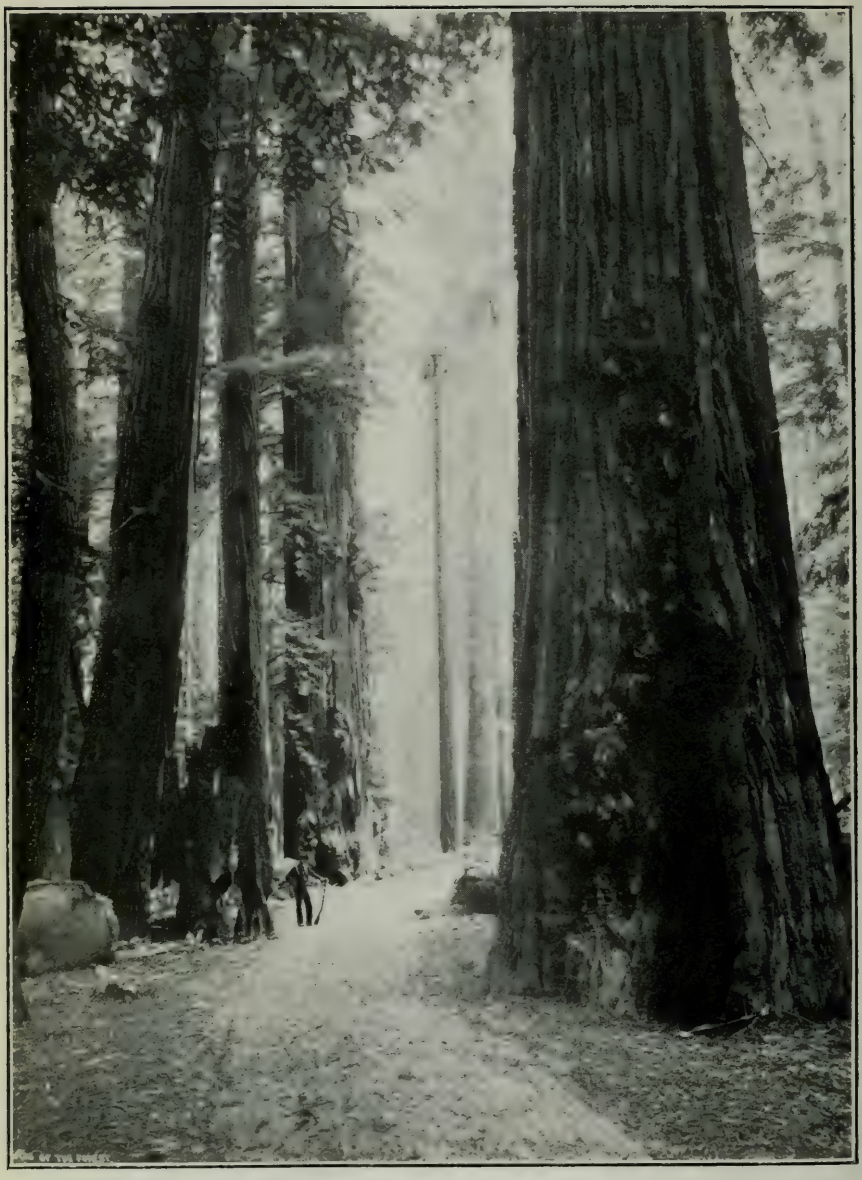
The principal timber in California of commercial value embraces the *Sequoia gigantea,* commonly known as the Big Tree, and the *Sequoia sempervirens*, commonly known as the redwood; the great sugar pine and the Oregon pine, sometimes known as the Douglas fir. These, and many other forest trees, are native Californian. They include various species of pine and fir, oak and ash, chestnut, sycamore, cottonwood, and maple.

Another tree of great commercial value, which is not native of California, but transplanted from Australia, is the eucalyptus. Of more than 150 species identified in the Australian forests, fully 100 have been introduced and planted in California. These trees are chiefly used for piles and poles. They grow to heights of from 100 to 300 feet, and are said to attain in Australia to a diameter of from 10 to 15 feet. That diameter is not essential to their usage in California.

The Big Tree timber belt in California lies along the western exposure of the Sierra Nevada, facing the Pacific Ocean, and extending from Calaveras County, in the north, to the head of Deer Creek, in the south. The maximum distance is about 200 miles, which is broken by two gaps of 40 miles each. In the earlier days of California the Big Tree was known as the Great Washington Cedar—named for the first president of the United States. Another term applied to it was the Great First Born; that is to say, the father of the forest. These trees attain a height of from 200 to 300 feet, and occasionally 400 feet, reaching a diameter of from 20 to 30 feet, and in rare cases, 40 feet. The redwood forests extend along the coast from the Oregon line to and including Monterey County, and cover a total area of approximately 3,000 square miles. These trees, also, grow to a height of from 100 to 200 feet, and in diameter from 5 to 15 feet.

The great sugar pine is one of the most magnificent pines in the world,

and grows to a height of 150 to 300 feet, and in diameter from 10 to 15 feet. The sugar pine is probably the most cylindrical and cleanest of branch or knot of any of the forest trees in this State. The chief forests are on the tableland of the middle Yuba. While the forests on the Yuba are the largest, there are various groves of sugar pine in all parts of the State along the Sierra; and also in the highest points of the Coast Range, from Humboldt County to the Santa Lucia Mountains.



Redwoods, Mendocino County.

WATER POWER DEVELOPMENT

California has recourse to three great drainage basin systems for the development of water power. These are the coast or ocean systems, and the Great Basin or interior system. The coast systems are divided by the United States Geological Survey in two general subdivisions, known as the Southern Pacific Drainage Basin system and the Northern Pacific Drainage Basin system. The Southern Pacific includes the territory along the Pacific coast, extending from the Mexican line to Point Bonita, California, in which are included the Coast ranges of mountains. This division or system of basins includes San Francisco Bay, the Sacramento and San Joaquin rivers, and minor streams. Point Bonita is situate in the southwestern corner of Marin County, on the north side of the entrance to the Golden Gate. Extending northward from Point Bonita the Northern Pacific system continues to the Canadian line, and is made up of the drainages of the Columbia and Willamette rivers, and minor streames, and Puget Sound, and includes the California northerly coast, and the coasts of Oregon and Washington, and extends into Idaho, Montana, Wyoming, and Nevada.

The Great Basin, as it is described by the United States Geological Survey, includes the drainages of the Wasatch Mountains in Utah, Wyoming, and Nevada, the Humboldt River in Nevada, the Sierra Nevada eastern drainage in California, Nevada, and Oregon, and minor streams in Nevada, Utah, and Oregon.

In a later report of the Geological Survey regarding surface waters of the several drainage basin systems in California, the Great Basin Drainage Division within this State is described as being all the drainage from the eastern slope of the Sierra Nevada within the boundaries of the State, which comprise all or part of the drainage basins of Susan River and Honey Lake, Truckee River and Lake Tahoe, Carson River, Walker River, Mono Lake, and Owens River and Owens Lake. These have not outlet to the ocean, and the entire runoff from these basins is dissipated mainly through evaporation from the lakes and sinks in the waters collected. Of these streams the Truckee, Carson, and Walker rivers discharge outside of California.

The California portion of the Northern Pacific Division also represents a small proportion of the entire area of that division included

in California, Oregon, and Washington, which have a total of 59,000 square miles in this drainage system.

California's proportion of the Southern Pacific Division includes nearly all of the 70,700 square miles in California and Oregon. In this division are included the drainages of the Sacramento and San Joaquin rivers and minor streams, both north and south, and include the Coast ranges from San Diego to Point Bonita. The per annum flow from this area, estimated by the Geological Survey, is 2,193 billion cubic feet. The possible development of this drainage system is estimated at a minimum of 3,215,400 horse-power, and an assumed maximum development of 7,808,300 horse-power.

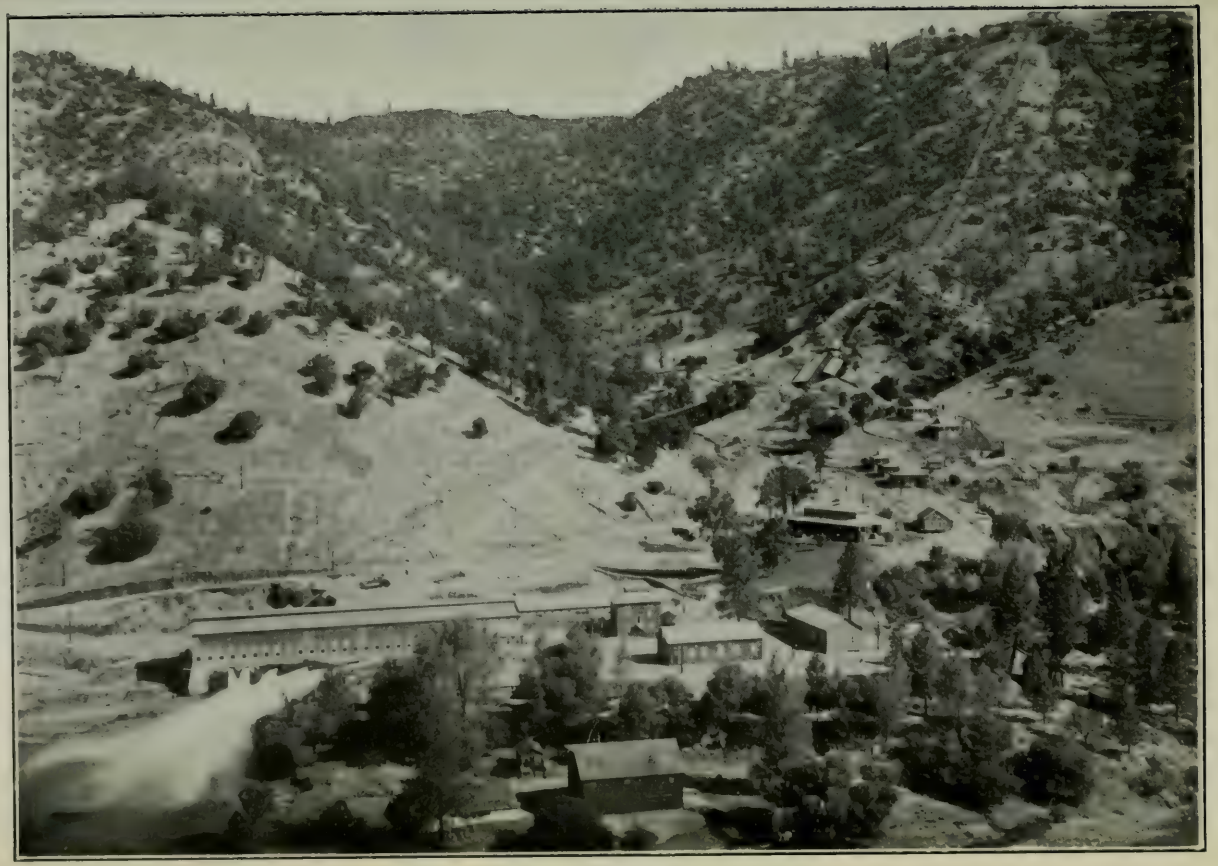
The per annum flow from the area in the Northern Pacific Division, including California, Oregon, and Washington, from the minor streams, is given as 3,500 billion cubic feet. The minimum possible development of this system for California, Oregon, and Washington, from minor streams, is 1,800,000 horse-power, and an assumed maximum development of 3,560,000 horse-power. California has recourse to, or draws from, only a very small proportion of this drainage system.

The assumed maximum development of the Great Basin, including the states named and not including Tulare Lake drainage, is estimated at 622,000 horse-power.

The combined minimum powers possible of development in the three great divisions for their entire area is given by the Geological Survey as 17,813,100 horse-power. The assumed maximum is estimated at 33,310,300 horse-power. The total aggregate number of wheels in operation, developing water power in the three great divisions, in 1908 was 2,728, developing 1,011,866 horse-power. In that year California had 1,070 wheels, representing about 39 per cent of the entire wheel installment of the three great divisions. The development in California was in that year 466,777 horse-power, which, compared with the total aggregate development of the combined area of the three great divisions, represented about 46 per cent. These three great drainage systems cover a total aggregate area of 584,100 square miles and extend into eight states. The entire area of California is 153,650 square miles, the greater part of which area is included in these drainage systems. This area represents only about 26 per cent of the total area of the three drainage systems.

In the progress of development of water power, California is the second state in the Union. In 1908 this State had developed a total of 466,777 horse-power, out of a total possible minimum of 3,950,000 horse-power. This power was developed by the employment of 1,070 water wheels, which averaged per unit of installation about 436 horse-power. The wheels were manufactured in California.

New York was the first state in water power development, having a



Water Power Development, Amador County.

total of 885,862 horse-power, of which a large proportion was made up of the power of Niagara Falls, on the New York side.

The third state in the progress of water power development was Maine, with 343,096 horse-power, developed by 2,797 wheels, an average of 123 horse-power per wheel. The fact that Maine is one of the oldest states in the development of water power, and the development of California is comparatively recent, the contrast in unit capacity is considered significant.

In 1908 these 1,070 wheels in California were distributed between the three great divisions in the following order: In the Southern Pacific Division there were 820 wheels, developing 423,597 horse-power; these were divided as follows: 74 wheels in the drainage basins of the minor streams, developing 50,183 horse-power; San Francisco Bay, 11 wheels, 6,455 horse-power; Sacramento River, 576 wheels, 280,735 horse-power, and the lower San Joaquin River, 159 wheels, 86,224 horse-power. In the Great Basin Division, California had 74 wheels of 17,737 horse-power. In the Northern Pacific Division, California had 176 wheels of 25,440 horse-power, which powers were developed only from the minor streams of this division.

In 1910 the aggregate number of water wheels of all types and sizes in operation in California was approximately 3,800. This figure is based upon conservative estimates, and is not confined to the wheels operated in the initial development of water power, but includes those in minor plants whose source of water is not direct from stream or storage reservoir. The Geological Survey report of 1,070 wheels operating in California in 1908 included only those employed in the direct or initial development of water power; and no doubt, in some instances, a double unit installation was recorded as representing one wheel, since in many cases only one wheel of such double unit is constant, the other being employed only in alternating or in the capacity of reserve power.

Considering these ratios of development and possible horse-power development in California compared with the other states in these three great divisions, there will never be any lack of power for such industries as may be operated, either directly or indirectly, by water power. The possibilities of manufacturing and other industrial enterprises of California requiring power, either electric power developed by water, or direct water power, are equal to any possible demand that may be made. A large proportion of the electric power generated in the State is by the direct application of water power, controlled by water wheels manufactured in California; and in addition to the developed horse-power by the operation of water wheels direct from the natural water sources, there are a large number of large and small industrial plants that are operated by direct water power, or by electric power generated

by water power taken from the supply provided the cities in various parts of the State.

The development of the water wheel in California began in about 1866, when an iron works established in San Francisco made a cast-iron wheel to drive a 16-stamp mill at a mine in Calaveras County. It was the first wheel that embodied a material change in the action of the water from that which occurred in the old hurdy-gurdy wheel. As late as 1870, however, water wheels were still made entirely of wood. The buckets were shaped only so that their wood flanges covered the sides of the buckets to confine the water. The first wheel of this sort was applied to a stamp mill in Sutter Creek.

In the development and improvement of the water wheel, various inventors and manufacturers have claimed the original jet-splitting principle, and whether the matter has been settled definitely it is no longer a pertinent issue. It is sufficient to say that thoroughly practical types of water wheel have been invented and manufactured in California, and are used all over the Pacific coast, and have proved to be efficient.

The California water wheels had their practical initiation during the period when the quartz mines were being extensively developed and made profitable. The utility of the water wheel in generating electric power was recognized to the satisfaction of investors about fifteen years ago. There had been previous applications of this method of generating electricity, but until the great demand arose for electric power that could be produced economically, the application of water power by means of tangential wheels was not generally accepted. To the manufacturers of the various types of practical water wheels in California must be credited the rapid advancement in the use of water power for the generation of electricity, and incidentally for direct application to manufacturing plants. And yet the use of the water wheel and the application of water power to general purposes of generation and direct motive power is in its infancy. In fact, in every branch of industry in the State of California where water can be made applicable for motive power purposes, there is opportunity for the employment of the water wheel. The topographical situation of the State is such that there is scarcely a county or section in which water power can not be applied. The future of this great natural source of power is beyond computation. Coincident with the evolution of the water wheel, there has been evolved to a degree of almost perfection, the internal combustion engine. With these two methods of generating power the advancement in agricultural fields is assured. There are large areas adjacent to the local drainage systems that can be put under cultivation by the application of water for irrigation, developed by the water wheel and the combustion engine. These uncultivated

lands occupy situations in various parts of the State, chiefly in those sections where petroleum is the principal product. These arid lands are, in the majority of cases, susceptible to fertilization and irrigation and can be made arable by the proper application of water.

There is also a considerable area of semi-arid land and lands now cultivated to cereals and pastures, that can be made produce much more valuable crops by the application of irrigation by means of pumping plants, whose motive power may be the water brought down from higher altitudes. In fact, there is a great future for the farmer in many sections of the State where water is available.

PART TWO—STATISTICAL.

from $3 to $6; 13.1 per cent, from $6 to $9; 13.2 per cent, from $9 to $12; 20.4 per cent, from $12 to $15; 17.4 per cent, from $15 to $18; 12.4 per cent, from 18 to $21; 8.5 per cent, from $21 to $25, while 10.8 per cent received $25 and over. 49.1 per cent of the total number of employees considered received over $15 per week.

In the division "Store and Office Employees" there were considered 13,868 persons. Of this number, 0.6 per cent worked less than 8 hours; 41.5 per cent worked 8 hours; 42.6 per cent worked 9 hours; 14.5 per cent worked 10 hours; 0.5 per cent worked 11 hours, and 0.3 per cent worked 12 hours and over per day. 0.2 per cent received less than $3 per week; 6.7 per cent received from $3 to $6; 15.1 per cent received from $6 to $9; 13.9 per cent received from $9 to $12; 15.4 per cent received from $12 to $15; 17.2 per cent received from $15 to $18; 11.1 per cent received from $18 to $21; 6.3 per cent received from $21 to $25, and 14.1 per cent received $25 and over. 48.7 per cent of the total number considered in this group received over $15 per week.

Tables V and VI.

In the investigation of hours of labor and wages paid in stores and factories in the city of Oakland, data was secured covering 12,121 individuals. Of this number 87, or 0.7 per cent, were employed less than 8 hours per day; 4,651, or 38.4 per cent, worked 8 hours; 5,454, or 45.0 per cent, worked 9 hours; 1,671, or 13.8 per cent, worked 10 hours; 14, or 0.1 per cent, worked 11 hours, while 244, or 2.0 per cent, worked 12 hours and over. The wages paid ranged from less than $3 to $25 and over per week. 0.3 per cent received less than $3 per week; 2.8 per cent received from $3 to $6; 8.8 per cent received from $6 to $9; 11.6 per cent received from $9 to $12; 12.6 per cent received from $12 to $15; 17.9 per cent received from $15 to $18; 14.6 per cent received from $18 to $21; 13.1 per cent received from $21 to $25, while 18.3 per cent received $25 and over.

In the division "Store and Office Employees" there was considered a total of 3,727 individuals. Of this number, 1.0 per cent worked less than 8 hours per day; 49.8 per cent worked 8 hours; 40.5 per cent worked 9 hours; 8.4 per cent worked 10 hours, while 0.3 per cent worked over 10 hours. 0.1 per cent received less than $3 per week; 0.9 per cent received from $3 to $6; 14.3 per cent received from $6 to $9; 11.8 per cent received from $9 to $12; 9.9 per cent received from $12 to $15; 16.9 per cent received from $15 to $18; 11.6 per cent received from $18 to $21; 8.7 per cent received from $21 to $25, while 19.8 per cent received $25 and over. 57.0 per cent of the total number of persons considered under this group received over $15 per week.

Tables VII and VIII.

In the investigation of hours of labor and wages paid in stores and factories in the city of Sacramento, data was secured on 4,491 persons. Of this number, 12, or 0.3 per cent, worked less than 8 hours per day; 1,995, or 44.4 per cent, worked 8 hours; 1,070, or 23.8 per cent, worked 9 hours; 612, or 13.6 per cent, worked 10 hours; 434, or 9.7 per cent, worked 11 hours, while 368, or 8.2 per cent, worked 12 hours and over per day. The wages paid ranged from less than $3 to $25 and over per week. 0.3 per cent received less than $3 per week; 6.1 per cent received from $3 to $6; 14.0 per cent received from $6 to $9; 15.8 per cent received from $9 to $12; 15.4 per cent received from $12 to $15; 13.6 per cent received from $15 to $18; 11.4 per cent received from $18 to $21; 8.8 per cent received from $21 to $25, and 14.6 per cent received $25 and over; 48.4 per cent of the total number of persons considered received over $15 per week.

Tables IX and X.

In the investigation of hours of labor and wages paid in stores and factories in the city of San Jose, data was secured on a total of 3,901 persons. Of this number, 6.0 per cent worked less than 8 hours per day; 19.8 per cent worked 8 hours; 34.0 per cent worked 9 hours; 26.8 per cent worked 10 hours; 0.7 per cent worked 11 hours, while 18.1 per cent worked 12 hours and over. The wages paid ranged from less than $3 to $25 and over per week. 1.0 per cent received less than $3 per week; 3.0 per cent received from $3 to $6; 14.3 per cent received from $6 to $9; 16.7 per cent received from $9 to $12; 21.7 per cent received from $12 to $15; 11.7 per cent received from $15 to $18; 13.2 per cent received from $18 to $21; 6.6 per cent received from $21 to $25, while 12.7 per cent received $25 and over. Of the total number of persons considered, 44.2 per cent received over $15 per week.

Tables XI and XII.

In the investigation of hours of labor and wages paid in stores and factories in the city of Stockton, data was secured covering 1,880 individuals. Of this number 0.9 per cent worked less than 8 hours per day; 24.0 per cent worked 8 hours; 51.1 per cent worked 9 hours; 18.7 per cent worked 10 hours; 1.5 per cent worked 11 hours, while 3.8 per cent worked 12 hours and over. The wages paid ranged from $3 to $25 and over per week. 3.9 per cent received from $3 to $6 per week; 7.4 per cent received from $6 to $9; 11.3 per cent received from $9 to $12; 15.4 per cent received from $12 to $15; 17.4 per cent received from $15 to $18; 19.9 per cent received from $18 to $21; 11.8 per cent received from $21 to $25, while 12.9 per cent received $25 and over. 62.0 per cent of the total number considered received over $15 per week.

Tables XIII and XIV.

In the investigation of hours of labor and wages paid in stores and factories in the city of San Diego, data was secured on 1,728 persons. Of this number, 0.6 per cent worked less than 8 hours per day; 26.6 per cent worked 8 hours; 30.8 per cent worked 9 hours; 34.1 per cent worked 10 hours; 7.2 per cent worked 11 hours, while 0.7 per cent worked 12 hours and over. The wages paid ranged from less than $3 per week to $25 and over. 0.1 per cent received less than $3 per week; 3.7 per cent received from $3 to $6; 12.7 per cent received from $6 to $9; 12.7 per cent received from $9 to $12; 17.7 per cent received from $12 to $15; 19.3 per cent received from $15 to $18; 14.2 per cent received from $18 to $21; 9.3 per cent received from $21 to $25, while 10.3 per cent received $25 and over. 53.1 per cent of the total number considered received over $15 per week.

Tables XV and XVI.

In the investigation of hours of labor and wages paid in stores and factories in the "Miscellaneous Towns" of the State, data was secured covering a total of 18,037 individuals. Of this number, 0.5 per cent worked less than 8 hours per day; 21.7 per cent worked 8 hours; 42.9 per cent worked 9 hours; 31.3 per cent worked 10 hours; 1.5 per cent worked 11 hours, and 2.1 per cent worked 12 hours and over. The wages paid ranged from less than $3 to $25 and over per week. 0.2 per cent received less than $3 per week; 1.4 per cent received from $3 to $6; 7.6 per cent received from $6 to $9; 11.2 per cent received from $9 to $12; 23.1 per cent received from $12 to $15; 16.8 per cent received from $15 to $18; 18.0 per cent received from $18 to $21; 10.4 per cent received from $21 to $25, while 11.3 per cent received $25 and over. Of the total number considered, 56.5 per cent received over $15 per week.

Table XVII.

A total of 141,172 employees was considered in the investigation of hours of labor and wages paid in stores and factories throughout the State. Of this number, 1.9 per cent worked less than 8 hours per day; 38.8 per cent worked 8 hours; 37.7 per cent worked 9 hours; 17.9 per cent worked 10 hours; 1.6 per cent worked 11 hours, and 2.1 per cent worked 12 hours and over. The wages paid ranged from less than $3 to $25 and over per week. 0.1 per cent received less than $3 per week; 3.3 per cent received from $3 to $6; 10.2 per cent received from $6 to $9; 12.0 per cent received from $9 to $12; 16.7 per cent received from $12 to $15; 16.0 per cent received from $15 to $18; 13.5 per cent received from $18 to $21; 11.3 per cent received from $21 to $25, while 16.9 per cent received $25 and over. 57.7 per cent of the total number of persons considered received over $15 per week.

Table XVIII.

In the city of San Francisco data was secured covering 13,465 female employees. Of this number, 4.7 per cent worked less than 8 hours per day; 56.3 per cent worked 8 hours; 28.3 per cent worked 9 hours; 10.1 per cent worked 10 hours; 0.5 per cent worked 11 hours, and 0.1 per cent worked 12 hours and over. The wages paid female employees in the city of San Francisco ranged from less than $3 per week to $25 and over. 0.3 per cent received less than $3; 8.8 per cent received from $3 to $6; 23.9 per cent received from $6 to $9; 26.4 per cent received from $9 to $12; 18.8 per cent received from $12 to $15; 11.7 per cent received from $15 to $18; 5.3 per cent received from $18 to $21; 2.1 per cent received from $21 to $25, while 2.7 per cent received $25 and over. The largest group received from $6 to $12 per week. 50.3 per cent of the total number fall within this group. 21.8 per cent of the total number of female employees received over $15 per week.

Table XIX.

In the State at large data was secured on a total of 32,809 female employees. Of this number, 2.7 per cent worked less than 8 hours per day; 43.6 per cent worked 8 hours; 35.8 per cent worked 9 hours; 13.4 per cent worked 10 hours; 1.5 per cent worked 11 hours, while 3.0 per cent worked 12 hours and over. Wages paid to female employees throughout the State ranged from less than $3 to $25 and over per week. 0.4 per cent received less than $3 per week; 9.5 per cent received from $3 to $6 per week; 28.8 per cent received from $6 to $9; 26.5 per cent received from $9 to $12; 17.6 per cent received from $12 to $15; 9.7 per cent received from $15 to $18; 4.1 per cent received from $18 to $21; 1.6 per cent received from $21 to $25, and 1.8 per cent received $25 and over. The largest number received from $6 to $12; 55.3 per cent of the total being in this group. 17.2 per cent of the total number of females considered received over $15 per week.

INSPECTION.

Table I.

In the city of San Francisco 2,960 establishments were inspected. Under the head of "Manufacturing" there were inspected 1,470 establishments, employing a total of 38,353 persons, of whom 30,422 or 79.3 per cent were males; and 7,931 or 20.7 per cent were females. Minors under the age of eighteen years constituted 4.9 per cent of the total number of employees, while minors under sixteen years of age constituted but 0.7 per cent. Under the head of "Wholesale" there were inspected 512 establishments, employing a total of 9,138 persons, of whom 7,745, or 84.8 per cent, were males, and 1,393, or 15.2 per cent, were females. Minors under the age of eighteen years constituted 4.1 per cent of the total, while minors under sixteen years constituted but 0.7 per cent. Under the head of "Retail" there were inspected 512 establishments, employing a total of 10,364 persons, of whom 6,044, or 58.3 per cent, were males, and 4,320, or 41.7 per cent, were females. Minors under eighteen years constituted 11.5 per cent of the total number employed, while minors under sixteen years of age constituted 4.2 per cent. Under the head "Miscellaneous" there were inspected 466 establishments, employing a total of 6,259, of whom 5,441, or 86.9 per cent, were males, and 818, or 13.1 per cent, were females. Minors under the age of eighteen years constituted 2.3 per cent of the total, while minors under the age of sixteen years constituted 0.4 per cent.

In the total of 2,960 establishments inspected in San Francisco there were employed 64,114 persons, of whom 49,652, or 77.4 per cent, were males, and 14,462, or 22.6 per cent, were females. Minors under eighteen years constituted 5.6 per cent of the total number employed, while minors under sixteen years of age constituted 1.3 per cent.

Table II.

In the city of Los Angeles 1,514 establishments were inspected. Under the head of "Manufacturing" there were inspected 960 establishments employing 29,445 persons, of whom 23,360, or 79.3 per cent, were males, and 6,085, or 20.7 per cent, were females. Minors under the age of eighteen years constituted 4.6 per cent of the total number employed, while minors under the age of sixteen years constituted but 0.8 per cent. Under the head of "Wholesale" 201 establishments were inspected, employing a total of 4,536 persons, of whom 3,781, or 83.4 per cent, were males, and 755, or 16.6 per cent, females. Minors under the age of eighteen years constituted 5.3 per cent of the total, while minors under the age of sixteen years constituted 0.8 per cent. Under the head of "Retail" there were inspected 244 establishments, employing 13,672 persons, of whom 9,422, or 68.9 per cent, were males, and 4,250, or 31.1

per cent, females. Minors under the age of eighteen years constituted 6.9 per cent of the total, while 2.7 per cent were minors under the age of sixteen years. Under the head of "Miscellaneous" 109 establishments were inspected, employing a total of 1,725 persons, of whom 1,545, or 89.6 per cent, were males, and 180, or 10.4 per cent, females. Minors under the age of eighteen years constituted 0.9 per cent of the total, while minors under the age of sixteen years constituted but 0.1 per cent.

In the total of 1,514 establishments inspected in the city of Los Angeles there were employed 49,378 persons, of whom 38,108, or 77.2 per cent, were males, and 11,270, or 22.8 per cent, females. Minors under the age of eighteen years constituted 5.1 per cent of the total number employed, while minors under the age of sixteen years constituted 1.3 per cent.

Table III.

In the city of Oakland 600 establishments were inspected. Under the head of "Manufacturing" there were inspected 300 establishments, employing 8,540 persons, of whom 6,508, or 76.2 per cent, were males, and 2,032, or 23.8 per cent, females. Minors under the age of eighteen years constituted 11.3 per cent of the total number of employees, while minors under the age of sixteen years constituted 2.7 per cent. Under the head of "Wholesale" 67 establishments were inspected, employing a total of 709 persons, of whom 621, or 87.6 per cent, were males, and 88, or 12.4 per cent, females. Minors under the age of eighteen years constituted 0.8 per cent, while no minors under the age of sixteen were employed. Under the head of "Retail" 166 establishments were inspected, employing 3,268 persons, of whom 1,999, or 61.2 per cent, were males, and 1,269, or 38.8 per cent, females. Minors under the age of eighteen years constituted 12.5 per cent of the total, while minors under the age of sixteen years constituted 3.8 per cent. Under the head of "Miscellaneous" there were inspected 67 establishments, employing a total of 732 persons, of whom 611, or 83.4 per cent, were males, and 121, or 16.6 per cent, females. Minors under the age of eighteen years constituted but 1.0 per cent. No minors under the age of sixteen years were employed.

In the total of 600 establishments inspected in the city of Oakland, there were employed 13,249 persons, of whom 9,739, or 73.5 per cent, were male, and 3,510, or 26.5 per cent, female. Minors under the age of eighteen years constituted 10.5 per cent of the total number employed, while minors under the age of sixteen years constituted 2.6 per cent.

Table IV.

In the city of Sacramento there were inspected a total of 165 establishments, employing 4,9555 persons, of whom 3,057, or 61.7 per cent,

were male, and 1,898, or 38.3 per cent, female. Minors under the age of eighteen years constituted 14.5 per cent of the total number of employees, while minors under the age of sixteen years constituted 3.3 per cent.

Table V.

In the city of San Jose there were inspected 210 establishments, employing a total of 4,163 persons, of whom 2,638, or 63.4 per cent, were male, and 1,525, or 36.6 per cent, were female. Minors under the age of eighteen years constituted 11.3 per cent of the total number of employees, while minors under the age of sixteen years constituted 4.1 per cent.

Table VI.

In the city of Stockton there were inspected 112 establishments, employing 2,049 persons, of whom 1,654, or 80.7 per cent, were male, and 395, or 19.3 per cent, female. Minors under the age of eighteen years constituted 6.6 per cent of the total, while minors under the age of sixteen years constituted 1.3 per cent.

Table VII.

In the city of San Diego there were inspected 98 establishments, employing a total of 1,803 persons, of whom 1,391, or 77.2 per cent, were male, and 412, or 22.8 per cent, female. Minors under the age of eighteen years constituted 5.3 per cent of the total employees, while minors under the age of sixteen years constituted 1.5 per cent.

Table VIII.

In the city of Fresno there were inspected 56 establishments, employing a total of 1,091 persons, of whom 855, or 78.4 per cent, were male, and 236, or 21.6 per cent, female. Minors under the age of eighteen years constituted 9.3 per cent of the total number employed, while minors under the age of sixteen constituted 3.6 per cent.

Table IX.

In the city of Berkeley there were inspected 72 establishments, employing 1,786 persons, of whom 1,419, or 79.4 per cent, were male, and 367, or 20.6 per cent, female. Minors under the age of eighteen years constituted 3.1 per cent of the total number of employees, while minors under the age of sixteen years constituted 0.5 per cent.

Table X.

In the city of Alameda there were inspected 67 establishments, employing 683 persons, of whom 589, or 86.2 per cent, were male, and 94, or 13.8 per cent, female. Minors under the age of eighteen years constituted 5.7 per cent of the total number of employees, while minors under the age of sixteen years constituted 0.6 per cent.

Table XI.

In the city of Pasadena there were inspected 133 establishments, employing 2,006 persons, of whom 1,426, or 71.1 per cent, were male, and 580, or 28.9 per cent, female. Minors under the age of eighteen years constituted 8.9 per cent of the total, while minors under the age of sixteen years constituted 2.6 per cent.

Table XII.

In the city of San Rafael, 61 establishments were inspected, employing a total of 466 persons, of whom 386, or 82.8 per cent, were male, and 80, or 17.2 per cent, female. Minors under the age of eighteen years constituted 4.0 per cent of the total number of employees, while minors under the age of sixteen years constituted but 0.2 per cent.

Table XIII.

In the "Miscellaneous Towns" of the State there were inspected 599 establishments, employing a total of 12,142 persons, of whom 10,440, or 86.0 per cent, were male, and 1,703, or 14.0 per cent, female. Minors under the age of eighteen years constituted 3.0 per cent of the total number of employees, while minors under the age of sixteen years constituted 0.6 per cent.

Table XIV.

A total of 6,647 establishments were inspected in the State. These establishments employed 157,886 persons, of whom 121,354, or 76.9 per cent, were male, and 36,532, or 23.1 per cent, female. Minors under the age of eighteen years constituted 6.1 per cent of the total number of employees, while minors under the age of sixteen years constituted 1.6 per cent.

SANITATION AND VENTILATION.

Table I.

In an investigation of the conditions of sanitation and ventilation in stores and factories in the city of San Francisco, 2,960 establishments were inspected. In 2,487 establishments the sanitation was reported as "Good," 447 as "Fair," and 26 as "Bad." The ventilation in 2,520 establishments was reported as "Good," 438 as "Fair," and 2 as "Bad."

Table II.

In the city of Los Angeles 1,514 establishments were inspected. The sanitary condition in 1,353 establishments was reported as "Good," 155 as "Fair," and in 6 establishments as "Bad." The ventilation in 1,467 establishments was reported as "Good," 43 "Fair," and 4 as "Bad."

Table III.

In the city of Oakland 600 establishments were inspected. The sanitary condition in 546 establishments was reported as "Good," 52 as "Fair," and 2 as "Bad." The ventilation in 551 establishments was reported as "Good," and 49 as "Fair."

Table IV.

In the city of Sacramento 165 establishments were inspected. The sanitary condition in 155 establishments was reported as "Good," 8 as "Fair," and 2 as "Bad." The ventilation in 163 establishments was reported as "Good," and 2 as "Fair."

Table V.

In the city of San Jose 210 establishments were inspected. The sanitary condition in 207 establishments was reported as "Good," and 3 as "Fair." The ventilation in 210 establishments was reported as "Good."

Table VI.

In the city of Stockton 112 establishments were inspected. The sanitary condition in 79 establishments was reported as "Good," and 33 as "Fair." The ventilation in 99 establishments was reported as "Good," and 13 as "Fair."

Table VII.

In the city of San Diego 98 establishments were inspected. The sanitary condition in 83 establishments was reported as "Good," 12 as "Fair," and 3 as "Bad." The ventilation in 81 establishments was reported as "Good," 13 as "Fair," and 4 as "Bad."

Table VIII.

In the city of Fresno 56 establishments were inspected. The sanitary condition in 30 establishments was reported as "Good," 25 as "Fair," and 1 as "Bad." The ventilation in 51 establishments was reported as "Good," and 5 as "Fair."

Table IX.

In the city of Berkeley 72 establishments were inspected. The sanitary condition in 70 establishments was reported as "Good," and 2 as "Fair." The ventilation in 71 establishments was reported as "Good," and 1 as "Fair."

Table X.

In the city of Alameda 67 establishments were inspected. The sanitary condition in 65 establishments was reported as "Good," and 2 as "Fair." The ventilation in 66 establishments was reported as "Good," and 1 as "Fair."

Table XI.

In the city of Pasadena 133 establishments were inspected. The sanitary condition in 99 establishments was reported as "Good," and 34 as "Fair." The ventilation in 132 establishments was reported as "Good," and 1 as "Fair."

Table XII.

In the city of San Rafael 61 establishments were inspected. The sanitary condition in 61 establishments was reported as "Good." The ventilation in 61 establishments was reported as "Good."

Table XIII.

In "Miscellaneous Towns" 599 establishments were inspected. The sanitary condition in 61 establishments was reported as "Good." The as "Fair," and 2 as "Bad." The ventilation in 593 establishments was reported as "Good," 4 as "Fair," and 2 as "Bad."

AGRICULTURE

Table I.

In the investigation there were visited by the agents of the Bureau 2,369 farms operated by white farmers. Of these 2,369 farms, 1,135 employed white labor only, 1,105 employed white and Japanese labor, and 129 employed various other races. It will thus be seen that the visits to farms operated by white persons were about equally divided between those employing white labor exclusively, and those employing white and Japanese labor. There were also visited 1,733 farms operated by Japanese. 132 of these farms were operated by Japanese owners, 1,170 by Japanese cash lessees, and 431 by Japanese share lessees. When this distribution of the total farms visited is considered in conjunction with the fact that the investigation was extended to all the principal agricultural, horticultural, and viticultural districts of the State, it can readily be seen that practically all the phases of the farm labor problem were encountered.

Table II.

On the farms employing white labor exclusively, 69.4 per cent contained less than 100 acres. Of those employing white and Japanese labor, 52.3 per cent were less than 100 acres. In both these groups, therefore, the majority of the farms were less than 100 acres. It must be further remembered that the size shown here represents the entire number of acres in each farm and not the acreage under cultivation. Only in a few instances was the entire acreage of a farm under cultivation. In the orchards and vineyards, as a rule, a portion of the acreage was devoted to raising hay or alfalfa for the stock, or used for pasturage.

Table III.

Of the farms operated by Japanese cash lessees, 79.8 per cent contained less than 50 acres, while only 51.4 per cent of those operated by Japanese share lessees were in this group. The reason for the farms operated under share lease being the larger may be found in the fact that under this form of leasing the Japanese lessee has little at stake outside of his labor. However, in both the cash and share lease farms the majority were under fifty acres.

Table IV.

The relation of the size of the farm to the character of crop grown is rather interesting. On farms where berries, citrus fruits, deciduous fruits, grapes, hops, and vegetables were grown, the majority of the farms were under 100 acres, while on those growing hay and grain, miscellaneous crops, nursery products, and sugar beets, the majority of the farms were over 100 acres.

Table V.

On the farms visited crops to the value of $29,150,708 were grown. Of this amount 19.8 per cent was grown by white farmers employing white labor only; 58.8 per cent by white farmers employing white and Japanese labor; and 21.4 per cent by Japanese farmers. The principal crop grown by white farmers employing white labor only was hay and grain, whereas, deciduous fruit was the principal crop grown by white farmers employing white and Japanese labor. The principal crop grown by Japanese farmers was vegetables, which was valued at over $2,500,000.

Tables VI and VII.

Of the 2,369 farms operated by white farmers, employing a total of 63,198 persons, 53.4 per cent of the labor was white; 36.4 per cent Japanese; 3.3 per cent Chinese; 3.2 per cent Mexican; 1.6 per cent Indian; 1.2 per cent Hindoo; while other races made up a little over 1.0 per cent. Females constituted about one quarter of the white help. White labor was employed in largest numbers in deciduous fruits and hops; Japanese labor in deciduous fruits and grapes; Chinese labor in deciduous fruits; Mexican labor in sugar beets; Hindoo labor in deciduous fruits, and Indians in hops.

Table VIII.

The average wage paid by white farmers, employing white labor exclusively, to male help was $1.38 per day with board, and $1.90 per day without board. The average wage paid by white farmers, employing white and Japanese labor, to white male help was $1.30 per day with board, and $1.82 per day without board; to Japanese labor $1.49 per day with board, and $1.54 per day without board. The wages paid to Japanese, however, can not be taken as their average earnings, as 49.2 per cent of the entire number employed were working by contract, or piece work, under which conditions the earnings of the Japanese were much larger than those of the whites. The average wage paid by Japanese farmers to Japanese labor was $1.57 per day with board, and $1.65 per day without board. It is worth noting that the Japanese were better paid by their own countrymen than by the white farmers; this

for two reasons—first, that he was in greater demand by his own countrymen; and, second, that only 12.5 per cent of the total number employed by Japanese farmers were working under contract, or piece work.

Table IX.

On the farms operated by white farmers, employing white labor exclusively, 55.8 per cent of the male help was employed on a fixed wage, and 44.2 per cent on contract, or piece work; while only 5.3 per cent of the female help was employed on a fixed wage, and 94.7 per cent on contract, or piece work. On the farms operated by white farmers, employing white and Japanese labor, 69.5 per cent of the male white labor was employed on a fixed wage, and 30.5 per cent on contract or piece work; while 12.9 per cent of the white female labor was employed on a fixed wage, and 87.1 per cent on contract, or piece work. On these same farms 50.8 per cent of the Japanese labor was employed on a fixed wage, and 49.2 per cent on contract, or piece work. On the farms operated by Japanese farmers 87.5 per cent of the Japanese labor was employed on a fixed wage, and only 12.5 per cent on contract, or piece work.

Tables X and XI.

On the farms operated by white farmers 68.3 per cent of the white labor and 61.7 per cent of the Japanese labor were employed less than three months in the year; only 16.7 per cent of the white labor, and 10.7 per cent of the Japanese labor were employed throughout the year. The largest number of both white and Japanese labor was employed during the month of September. During this month there were employed 29.1 per cent of the total whites, and 22.3 per cent of the total Japanese employed throughout the year.

Table XII.

A complete record was obtained of all the farms in the State devoted to the raising of sugar beets. 1,180 farms, containing 71,213 acres, were operated by white farmers; 94 farms, containing 5,200 acres, by Japanese farmers; and 16 farms, containing 904 acres, by Chinese farmers. The average production on farms operated by white farmers was 12.2 tons per acre; on farms operated by Japanese farmers 9.9 tons per acre; and on farms operated by Chinese farmers 13.3 tons per acre. The total production of sugar beets in this State was 928,447 tons, which was valued at $4,642,235 delivered at the sugar factories.

TRANSPORTATION AND COMMUNICATION

Table I.

In the table on shipping in the port of San Francisco is presented a record of 678 vessels regularly engaged in the trade of that port. This number did not include small pleasure crafts, fishing boats and scow schooners, plying on the bay of San Francisco. The vessels under consideration had an aggregate gross tonnage of 760,186 tons, and the number of persons regularly employed on them amounted to 14,443 whites and 1,235 Orientals. Of the white employees, the largest group by far was seaman. The group constituted 35.0 per cent of the total. Following this came the mates, with a total of 1,386, or 9.6 per cent; firemen, 1,243, or 8.6 per cent; waiters, 1,141, or 7.9 per cent; engineers, 1,012, or 7.0 per cent; cooks, 818, or 5.7 per cent, and masters, 700, or 4.9 per cent.

Table II.

The wages of masters ranged from $100 to $250 per month, according to the size of the vessel and the trade engaged in, the largest group being those paid $125. This group constituted 19.6 per cent of the total. The wages of mates ranged from $35 to $130, 19.9 per cent receiving $100 and over, and 34.8 per cent receiving from $75 to $100. The wages of seamen ranged from $20 to $75, 66.7 per cent receiving $45 to $50. Wages of engineers ranged from $50 to $175, 64.1 per cent receiving $100 and over. The wages of firemen ranged from $45 to $85, 47.7 per cent receiving $55. Of the total number employed in all occupations, 3.5 per cent received from $150 to $250 per month; 8.4 per cent, from $100 to $150; 8.1 per cent, from $75 to $100; 36.5 per cent, from $50 to $75, while 43.5 per cent received less than $50. The total amount of wages paid to persons of all occupations employed on vessels engaged in the trade of the port of San Francisco amounted to over $10,000,000 per annum.

Table III.

The Chinese and Japanese employed on the vessels under consideration were paid in Mexican silver (which has been reduced to its equivalent in United States gold coin). The larger part of the Orientals were employed as coal-passers, firemen, seamen and waiters. The range

of wages amounted to from $2.50 to $25 (gold) per month. Of a total of 1,235 employed, 127, or 10.3 per cent, received from $10 to $25 per month, while 1,108, or 89.7 per cent, received less than $10. The prevailing rate of wages was $7.50, 60.0 per cent of the total receiving that amount.

Table IV.

During the fiscal year ending June 30, 1910, there were employed on steam railroads in the State of California, 49,970 persons, which shows an increase of 19,205 over the number employed in the fiscal year ending June 30, 1908.

Table V.

A record was obtained of 14,372 persons engaged on the electric railroads. Of this number, 687, or 4.8 per cent worked 8 hours per day; 5,955, or 41.4 per cent, worked 9 hours per day; 7,660, or 53.3 per cent, worked 10 hours per day, and 70, or 0.5 per cent, worked over 10 hours. The wages ranged from $1.00 per day to over $4.00, the largest number, or 20.5 per cent, receiving $2.50 per day. 61.1 per cent of the total number employed received $2.50 and over per day.

Table VI.

Data was secured covering a total of 8,772 individuals employed in the telephone companies throughout the State. Of this number, 5,023, or 57.3 per cent, were males, and 3,749, or 42.7 per cent, were females. The wages of males ranged from $25 per month to over $125 per month, the largest group, or 25.6 per cent of the total, receiving from $90 to $100 per month. 92.5 per cent of the male employees received over $50 per month. The wages of the female employees ranged from $20 to over $125, the largest group, or 42.7 per cent of the total, receiving from $25 to $30 per month. 90.5 per cent of the total female employees received less than $50 per month.

EMPLOYMENT AGENCIES

Table I.

During the fiscal year ending June 30, 1909, a record was obtained from employment agencies operating in San Francisco, excluding those furnishing female and oriental help—which are treated in separate tables. Of 41,177 individual cases in which employment was secured through the agencies reporting, 10,301, or 25.0 per cent were furnished with employment in San Francisco, while 30,876, or 75.0 per cent were sent to outside places. The group "general laborers" was the largest, containing 13,688 persons, or 33.3 per cent. The three groups "general laborers," "railroad laborers," and "ranch hands" made up 59.7 per cent of the total number considered. The amount of fee paid for securing employment ranged from 25 cents to over $6.00. Only 4.3 per cent paid less than $1.00; 20.5 per cent paid $1.00; 21.3 per cent paid $1.50; 33.4 per cent paid $2.00; 7.3 per cent paid $2.50; 8.3 per cent paid $3.00, and 3.5 per cent paid over $3.00. The prevailing fee was $2.00, over one third of the total paying that amount. The average fee paid by all persons during the fiscal year ending June 30, 1909, was $1.81.

Table II.

During the fiscal year ending June 30, 1910, a record of 53,659 individual cases was obtained from the same agencies considered in the preceding year. Of this number, 10,506, or 19.6 per cent, were given employment in the city of San Francisco, while 43,153, or 80.4 per cent, were given employment outside this city. "General laborers" formed the largest group, 42.0 per cent of the positions furnished coming under this designation. The three groups, "general laborers," "railroad laborers," and "ranch hands," constituted 64.7 per cent of the total number of persons to whom employment was furnished. The fees paid for these positions ranged from 25 cents to over $6.00. Only 3.4 per cent paid less than $1.00; 31.6 per cent paid $1.00; 24.5 per cent paid $1.50; 24.1 per cent paid $2.00; 5.6 per cent paid $2.50; 6.6 per cent paid $3.00, and 2.9 per cent paid over $3.00. The prevailing fee was $1.00; 31.6 per cent of the total paying that amount. The average fee paid by all persons was $1.66. There was a decided drop in both the prevailing and the average fee paid from the preceding fiscal year. The prevailing fee fell from $2.00 to $1.00, and the average fee decreased from $1.81 to $1.66.

Table III.

In the city of Los Angeles a record of 35,593 individual cases was obtained from the employment agencies during the fiscal year ending June 30, 1910. Of this number, 12,994, or 36.5 per cent, were given employment in the city of Los Angeles, and 22,599, or 63.5 per cent, were sent to outside places. The fees paid ranged from 25 cents to over $6.00, the prevailing fee being $1.00, and the average fee $1.71.

Tables IV to IX.

In all the other tables presented on employment agencies only the records of the month of April are tabulated.

In the city of Oakland a record of 595 individual cases was obtained for the month of April, 1910. Of this number, 48.1 per cent were given employment in Oakland, and 51.9 per cent were sent to outside places. The prevailing fee was $2.00 and the average fee, $1.57.

In the city of Sacramento a record of 1916 individual cases was obtained. Of this number only 75, or 3.9 per cent were given employment in the city, while 1,841, or 96.1 per cent, were sent to outside places. The prevailing fee was $1.00 and the average fee, $1.50.

In the city of Stockton a record of 886 cases was obtained. Of this number, 123, or 13.9 per cent, were given employment in the city and 763, or 86.1 per cent, were sent to outside places. The prevailing fee paid was $1.50, and the average fee, $1.48.

In the city of San Diego a record of 384 persons was obtained. Of this number, 55, or 14.3 per cent, were given employment in the city, and 329, or 85.7 per cent, were sent to places outside the city. The prevailing fee was $2.50 and the average fee, $2.38.

Table X.

In the female employment agencies in the city of San Francisco a record was obtained of 342 persons, of whom 183, or 53.5 per cent, were given employment in San Francisco, and 159, or 46.5 per cent, were sent to outside places. The prevailing fee was $2.50, and the average fee, $2.51.

Table XI.

In the oriental employment agencies in the city of San Francisco a record was obtained of 261 persons. Of this number, 205, or 78.5 per cent, were given employment in San Francisco, and 56, or 21.5 per cent were sent to outside places. The prevailing fee was $3.00 and the average fee, $2.55.

The average fees paid by persons of all occupations during the month of April in the various localities of the State are given below:

San Francisco (male)	$1 59
San Francisco (female)	2 51
San Francisco (oriental)	2 55
Los Angeles (male)	1 52
Oakland (male)	1 57
Sacramento (male)	1 50
Stockton (male)	1 48
San Diego (male)	2 38

TABLES OF INDUSTRIAL STATISTICS

STORES AND FACTORIES

TABLE I. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during the Fiscal Year 1909-10.
(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
1. *Bakery and Restaurant Employees.*																
Bakers	255	------	40	155	50	9	1	------	------	------	------	3	8	79	119	46
Bakers, apprentices	19	------	2	7	9	1	------	------	------	1	18	8	2	------	------	------
Bakers, helpers	43	------	5	21	9	7	1	------	------	------	6	16	17	------	4	------
Cooks	387	------	26	22	244	70	25	------	------	2	12	13	31	150	127	32
Cooks, helpers	142	------	5	7	76	47	7	------	------	7	44	21	41	29	------	------
Kitchen help	372	3	34	10	208	96	21	------	4	35	200	128	5	------	------	------
Stewards	11	2	3	------	6	------	------	------	------	------	------	2	------	4	2	3
Waiters	647	125	9	15	441	29	28	------	10	84	132	376	28	13	------	4
Waitresses (F.)	435	70	80	55	221	5	4	------	42	131	241	20	1	------	------	------
Totals	2311	200	204	292	1264	264	87	------	56	260	643	587	133	275	252	105
2. *Breweries and Bottling Works.*																
Beer bottlers	151	------	138	12	1	------	------	------	------	------	5	2	44	80	12	8
Brewers	128	------	106	6	16	------	------	------	------	------	------	------	------	------	97	31
Coopers	9	------	9	------	------	------	------	------	------	------	------	------	------	------	8	1
Maltsters	20	------	20	------	------	------	------	------	------	------	------	------	------	------	21	------
Totals	308	------	273	18	17	------	------	------	------	------	5	2	44	80	137	40

3. *Butcher Shop and Slaughterhouse Employees.*															
Coolermen	16	1	12	3						3		7	3	1	2
Killers and dressers	93	34	59								5	16	12	37	23
Killers and dressers, apprentices	7		7							2	5				
Meat cutter	267	11	57	176		29			1			7	76	177	6
Meat cutters, apprentices	5		3	2					4	1					
Meat packers	47		44	3						2	29	10	2	4	
Sausage makers	53	11	28	14					1			7	28	16	1
Slaughterhouse workmen	76		76							4	33	39			
Vaqueros	21	4	14	3						1	5	6	6		3
Totals	585	61	294	201		29			6	13	77	92	127	235	35
4. *Candy, Confectionery, and Sugar Workers.*															
Biscuit bakers	42		42										11	31	
Biscuit bakers, apprentices	22		22						3	6	13				
Biscuit bakers, helpers	34		34							6	3	20	5		
Biscuit icers (F.)	24		24					24							
Biscuit packers (F.)	150		150					6	57	79	7	1			
Candy makers	37	4	31	2								8	11	9	9
Candy makers, helpers	53	13	40					2	8	20	13	6	4		
Chocolate and cocoanut workers	76		76							9	49	12	6		
Confectionery packers (F.)	205	64	141					44	138	15	4	4			
Cream dippers (F.)	91	23	68						35	41	12	3			
Ice cream makers	6	3	3									2	3	1	
Soda dispensers	8		8							2	3	2		1	
Totals	748	107	639	2				76	241	178	104	58	40	42	9
5. *Cannery Employees.*															
Canners (F.)	155			155				75	20	60					
Cannery workers	132		10	122					3	103	25	1			
Cook room workers	34		19			15					33		1		
Labelers (F.)	28		11	17					20	5	3				
Packers (dried fruit)	60		54	6							38	22			
Packers (dried fruit) (F.)	76	2	54	20					4	72					
Preparers (F.)	435		35	400				150	285						
Preservers	42			42					20	22					
Totals	962	2	183	762		15		225	352	262	99	23	1		

TABLE I. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.							
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
6. *Cigar and Tobacco Workers.*																
Cigar makers	160		143	7	10						10		16	7	127	
Cigar packers	11		11								1					10
Cigarette makers	16			16									16			
Cigarette makers (F.)	16			16								16				
Cigarette packers (F.)	47			47						47						
Labelers (F.)	13		6	7						4	2	7				
Tobacco strippers	8		6		2				1	7						
Tobacco strippers (F.)	49		37	12					5	44						
Tobacco workers	14		7	7					1	5	3	1	1	3		
Totals	334		210	112	12				7	107	16	24	33	10	127	10
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	463		363	94	6				21	32	84	230	52	18	14	12
Boot and shoe workers	240		1	239					12	20	18	37	50	56	37	10
Boot and shoe workers (F.)	107			107					9	33	27	31	3	4		
Bushelmen	19		7	9	3								2	5	10	2
Garment cutters	59		27	32						2	2	6	3	6	28	12
Garment fitters (F.)	25		20	5								2	5	11	3	4
Glove cutters	33		17	16								3	15	8	5	2
Glove finishers	8		4	4						1	3	4				
Glove makers (F.)	73		37	36						13	37	23				
Glove makers, apprentices (F.)	7		4	3					1	6						
Hat makers	89		30	59					1	2	11	17	19	14	14	11
Hat makers (F.)	132		68	64					12	25	39	19	13	8	11	5
Machine operators	22		12	8	2					8				6	4	4
Machine operators (F.)	1129		742	387				31	122	366	325	218	56	8	2	1
Milliners (F.)	155		97	54	4				21	30	24	28	15	14	4	19
Milliners, apprentices (F.)	30		13	17				4	19	5	2					
Necktie makers (F.)	48		21	27						24	19	3	1		1	
Seamstresses (F.)	418		342	76					30	44	90	174	36	22	8	14
Tailors	414		48	317	43	6					5	8	12	63	195	131
Tailors, cutters	49		8	38	3					1		2		1	9	6
Tailors, finishers (F.)	139		6	117	16				1	6	15	80	36	1		
Totals	3659		1867	1709	77	6		35	249	618	701	885	318	245	345	263

8. *Dairy Employees.*																
Butter makers	4			1	3							1	1		1	1
Can washers	54		9	23	22							30	23	1		
Totals	58		9	24	25							31	24	1	1	1
9. *Electrical Workers.*																
Electricians	162		160	2							2	1	9	7	52	91
Electricians, apprentices	102		102					4	14	11	19	33	13	8		
Electrical workers	82		82								11	9	7	8	47	
Electrical workers, helpers	17		17					2	10	1		4				
Totals	363		361	2				6	24	14	31	55	27	68	138	
10. *Glass Workers.*																
Art glass workers	28		28											3	25	
Art glass workers, apprentices	9		8	1				1	3	2	2	1				
Glass blowers	199		40	159											199	
Glass blowers, helpers	268		50	218						163	105					
Glass caners	7			7								7				
Glass caners (F.)	36		20	16					5	9	22					
Glass packers	61		16	45					4	20	26	7	4			
Glass packers (F.)	13			13					11	2						
Totals	621		162	459				1	23	196	155	15	4	3	224	
11. *Laborers, General.*																
Laborers	2165	8	751	1117	283		6	1	17	172	1026	756	151	36	6	
Totals	2165	8	751	1117	283		6	1	17	172	1026	756	151	36	6	
12. *Laundry Workers, Dyers, Etc.*																
Dyers and cleaners	69			69						2	10	22	19	9	7	
Dyers and cleaners (F.)	35			35					12	17	6					
Ironers, hand	109		9	19	53	20	8		10	31	49	16	2		1	
Ironers, hand (F.)	485		194	140	87	55	9	1	51	331	80	19	1	2		
Ironers, machine	18		2	16						6		11	1			
Ironers, machine (F.)	187		187						60	100	26	1				
Manglers	66		38	13	15				19	17	24	4	2			
Manglers (F.)	324		322	2					280	40	2		2			
Markers and distributors	196		189	6		1			4	13	8	8	130	26	7	
Markers and distributors (F.)	49		19	25	5				7	23	4	2	13			
Pressers	51		10	41						2		4	33	7	5	
Pressers (F.)	158		27	131				1	38	59	47	6	7			
Shirt finishers	14		3	6	1	4				9	1	4				

TABLE I. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
12. *Laundry Workers, Dyers, Etc.*—Cont.																
Shirt finishers (F.)	64	------	62	1	1	------	------	------	------	14	28	7	15	------	------	------
Shirt folders (F.)	20	------	15	4	1	------	------	------	------	9	11	------	------	------	------	------
Starchers	29	------	18	7	3	1	------	------	1	------	6	10	5	5	1	1
Starchers (F.)	116	------	89	18	9	------	------	------	------	5	96	10	4	1	------	------
Washroom hands	200	5	93	60	28	11	3	------	------	1	18	43	58	52	20	8
Totals	2190	5	1277	593	203	92	20	------	3	510	809	327	179	268	65	29
13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	265	------	187	63	15	------	------	------	------	------	2	------	6	32	182	43
Blacksmiths, apprentices	32	------	26	6	------	------	------	------	2	12	8	9	------	1	------	------
Blacksmiths, helpers	190	------	175	15	------	------	------	------	------	2	3	12	65	105	2	1
Boiler makers	107	------	107	------	------	------	------	------	------	------	------	------	------	4	39	64
Boiler makers, apprentices	26	------	26	------	------	------	------	------	1	11	3	5	5	------	1	------
Boiler makers, helpers	78	------	78	------	------	------	------	------	------	------	7	28	37	5	1	------
Casting chippers	54	------	50	4	------	------	------	------	------	------	------	1	23	24	6	------
Core makers	71	------	62	5	4	------	------	------	------	------	------	4	4	3	49	11
Core makers, apprentices	12	------	12	------	------	------	------	------	3	3	3	1	2	------	------	------
Cupolamen	20	------	17	2	1	------	------	------	------	------	------	------	4	6	10	------
Draughtsmen	126	7	109	10	------	------	------	------	------	------	1	2	8	13	39	63
Draughtsmen, apprentices	16	------	16	------	------	------	------	------	2	9	1	1	3	------	------	------
Elevator constructors	66	------	66	------	------	------	------	------	------	------	------	------	2	8	1	55
Elevator constructors, helpers	48	------	48	------	------	------	------	------	------	------	------	------	2	45	1	------
Flask makers	8	------	6	2	------	------	------	------	------	------	------	------	2	2	3	1
Foundry helpers	125	------	80	31	14	------	------	------	------	------	8	57	50	10	------	------
Machine hands	110	3	96	11	------	------	------	------	------	10	3	14	36	29	18	------
Machinists	1483	105	1332	34	12	------	------	------	------	------	------	1	63	212	1056	151
Machinists, apprentices	219	------	216	3	------	------	------	1	77	99	29	12	1	------	------	------
Machinists, helpers	472	------	466	6	------	------	------	------	------	13	25	170	213	42	9	------
Molders	375	------	354	11	10	------	------	------	------	------	------	10	------	7	239	119
Molders, apprentices	64	------	64	------	------	------	------	------	1	22	18	15	6	2	------	------
Molders, helpers	47	------	47	------	------	------	------	------	------	------	2	28	16	1	------	------
Safe makers	16	------	16	------	------	------	------	------	------	2	1	------	1	4	6	2
Stove mounters	6	------	4	2	------	------	------	------	------	------	------	------	------	------	4	2
Totals	4036	115	3660	205	56	------	------	1	86	183	114	370	549	555	1666	512

14. *Metal Workers.*																
Brass finishers	32		29	3							1		1	1	26	3
Brass finishers, helpers	7		7						1			2	4			
Brass workers	16		9	7									1	5	3	7
Coppersmiths	33		33												17	16
Coppersmiths, apprentices	4		4						1	2		1				
Coppersmiths, helpers	11		11										11			
Fixture makers	39		24	15								2	3	3	26	5
Fixture makers, helpers	28		2	26					2	6	20					
Galvanizers	9			9										2	4	3
Galvanizers, helpers	18			18								14	4			
Platers	23		12	11						1	1	1	2	1	17	
Polishers	32		12	20									6	10	16	
Polishers, helpers	6		3	3						3	1	1	1			
Totals	258		146	112					4	12	23	21	33	22	109	34
15. *Plumbers, Pipe Fitters, Etc.*																
Pipe fitters	20		14	6									1	4	8	7
Pipe fitters, helpers	5		4	1							1	3		1		
Plumbers	149		149												8	141
Plumbers, apprentices	9		9						1	2	3	3				
Plumbers, helpers	63		63								1	2	32	28		
Steam fitters	30		30											2	2	26
Steam fitters, helpers	28		28									1	23	4		
Totals	304		297	7					1	2	5	9	56	39	18	174
16. *Printing Trades.*																
Bindery girls (F.)	257		257						50	32	146	22	5	2		
Bookbinders	102		102										5	1	84	12
Bookbinders, apprentices	32		32						6	11	8	5	2			
Compositors	392	10	382									1	9	4	209	169
Compositors (F.)	39		29	10						1	6	7	14	4	5	2
Compositors, apprentices	56		56						6	17	12	15	2	2	2	
Engravers	43		37	6								1		1	4	37
Linotype operators	174	24	150												7	167
Linotype operators (F.)	6		6												2	4
Linotype operators, apprentices	5	1	4							1		1	3			
Lithographers	8		8											1	4	3
Lithographers, apprentices	2		2						1				1			
Paper cutters	22		18	4									5	8	8	1
Press feeders	188		180	8					1	10	7	59	76	34		1
Press feeders (F.)	6		6									2	4			
Pressmen	305	3	285	17							3	4	7	19	106	166

TABLE I. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
16. *Printing Trades, Etc.*—Continued.																
Pressmen, apprentices	56		56							8	7	8	27	5	1	
Proofreaders	36	2	34										1	5	3	27
Proofreaders (F.)	47	5	42							5	11	7	12	10		2
Stereotypers	47		47											1	2	44
Stereotypers, helpers	9		9									1	4	3		1
Totals	1832	45	1742	45					64	85	200	133	177	100	437	636
17. *Sheet Metal Workers.*																
Can makers	231			231					3	89	22	98	14	4	1	
Can makers (F.)	78			78						54	19	5				
Sheet metal workers	480		448	32								2	11	20	72	375
Sheet metal workers, apprentices	47		47							16	16	8	4			3
Sheet metal workers, helpers	103		97	6					2	4	4	24	30	32	4	3
Tinners	14		10	4											4	10
Totals	953		602	351					5	163	61	137	59	56	81	391
18. *Ship Builders, Riggers, Etc.*																
Boat builders	82		82										3	2	14	63
Boat builders, apprentices	17		17							5	3	7	2			
Riggers	69		69										44	13		12
Sail makers	26		26													26
Sail makers, apprentices	6		6							2	1	3				
Ship calkers	21		21													21
Ship joiners	18		18												2	16
Ship painters	9		9										2		6	1
Shipsmiths	13		13							2	2		1	1		7
Totals	261		261							9	6	10	52	16	22	146

19. *Soap and Candle Workers.*																
Candle makers (F.)	4			4							4					
Soap makers	5			5											2	3
Soap workers	19			19								7	11	1		
Soap wrappers (F.)	12		1	11						6	5	1				
Totals	40		1	39						6	9	8	11	1	2	3
20. *Store and Office Employees.*																
Bookkeepers	1630	124	1052	375	71	1	7			4	22	55	114	173	277	985
Bookkeepers (F.)	690	54	421	174	37		4	1	1	22	62	113	211	112	62	106
Cash boys	67		57	5	5				58	9						
Cash girls (F.)	133		123	10					133							
Cashiers	291	51	157	48	25	5	5		1	3	4	11	15	18	14	225
Cashiers (F.)	576	15	275	159	126	1			74	89	93	195	69	25	8	23
Collectors	217	12	118	77	10					4	8	15	39	63	36	52
Drapers	29		15	12	2					3	3		2	1	4	16
Drug clerks	61		8	5	39	2	7								2	59
Elevator operators	67		44	17	6					5	10	12	35	4	1	
Errand boys	1100	75	669	306	50			5	306	462	297	23	7			
Floor walkers	63		36	23	4					2	1		3	6	24	27
Office clerks	2282	432	1362	379	99		10		15	114	226	286	360	336	262	683
Office clerks (F.)	860	137	582	132	9				30	169	248	189	136	46	25	17
Porters and packers	2003	27	849	754	317	4	52		10	59	156	419	810	400	85	64
Salesmen	5527	146	3387	1472	465	4	53		6	30	102	193	482	726	659	3329
Saleswomen (F.)	2127	1	1338	567	221				158	498	546	417	283	122	54	49
Shipping clerks	624	13	378	204	21		8		2	50	66	49	126	144	97	90
Solicitors	211	1	198	9			3					2	16	118	11	64
Stenographers (F.)	1700	343	1123	217	16		1		4	95	260	383	532	270	73	83
Stock clerks	869	16	520	309	20		4		70	147	164	122	198	97	35	36
Stock clerks (F.)	117		92	15	10				46	35	30	3	2		1	
Telephone operators (F.)	59	8	39	11	1				1	9	24	21	3	1		
Wrappers	93		61	24	8			1	14	36	11	10	17	3	1	
Wrappers (F.)	68		58	10				2	19	41	5	1				
Totals	21464	1455	12962	5314	1562	17	154	9	948	1886	2338	2519	3460	2665	1731	5908
21. *Structural Iron Workers.*																
Architectural iron workers	34		3	31											29	5
Architectural iron workers, helpers	15		5	10						1	2	2	1	9		
Housesmiths	182		71	111										18	95	69
Housesmiths, apprentices	28		12	16					5	8	11	4				
Housesmiths, helpers	133		41	92								50	78	24	1	
Structural iron workers	123		62	61									1	7	50	65
Structural iron workers, apprent's.	23		7	16					1	12	2	5	3			
Structural iron workers, helpers	85		18	67							2	2	29	52		
Totals	623		219	404					6	21	17	43	112	110	175	139

TABLE I. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
22. *Tannery Employees.*																
Finishers	176			176								8	144	16	8	
Machine hands	313			313								49	262	2		
Tanners and curriers	14			14									14			
Tannery workers	12			12						5	7					
Wool pullers	14			14						4	10					
Totals	529			529						9	17	57	420	18	8	
23. *Textile Workers.**																
24. *Teamsters, Hostlers, Etc.*																
Drivers—																
Bakery	96		12	57	25	2						6	28	34	26	2
Bottle	73		29	24	18	2									55	18
Brewers (keg)	117		52	24	38	3							1	1	50	65
Construction	213		74	79	60						2	1	45	141	8	16
Draying	1005		58	37	641	135	134					27	82	448	419	29
General delivery	1092		347	437	254	20	34			34	16	71	237	453	239	42
Grocery	63			13	49		1			2	9	11	39	2		
Ice	51			32	19									20	29	2
Laundry	262		185	49	20	6	2				6	24	72	33	27	100
Lumber	110		19	52	27	12					1	3	6	54	40	6
Meat	123		5	60	58					6	11	10	39	27	26	4
Milk	148			35	113							1	14	31	102	
Horseshoers	52		18	34											33	19
Horseshoers, apprentices	14		2	12						4	7	1	2			
Stablemen and hostlers	449		51	31	178	52	137		1	1	3	21	80	194	135	14
Warehousemen	300	2	63	203	12		20			4	3	19	142	113	15	4
Yardmen (feed and fuel)	42			34	8							12	7	21	2	
Totals	4210	2	915	1213	1520	232	328		1	51	58	207	794	1572	1206	321

*No employees considered.

25. *Trunks, Harness, Etc.*																
Belt makers	31			31						5	2		1	21	8	1
Belt makers, apprentices	7			7										10	5	
Carriage trimmers	15		12	3									22	33	29	
Harness makers	84		6	78						1	3					
Harness makers, apprentices	4			4							3	1	1	6		
Leather cutters	11		1	7	3									4	7	1
Leather workers	12		1	11										1		
Leather workers (F.)	12		10	2						8	3		1	6	3	
Saddle makers	10			10												
Trunk and bag liners (F.)	15			15					3	9	3					
Trunk and bag makers	55		16	39						6	3	20	22	3	1	
Trunk and bag makers, apprentices	9			9					1	6	1		1			
Totals	250		34	213	3				4	35	18	21	48	74	48	2
26. *Upholsterers, Carpet Layers, Etc.*																
Carpet layers	18		18					1	3	1	12					1
Carpet sewers (F.)	9		5	4							1	3	4	1		
Mattress makers	111		61	50						1	8	9	9	12	58	14
Shade makers	6		6													6
Tick sewers (F.)	33		33							1	9	14	8	1		
Upholsterers	64		50	14						1	4	2	1	3	41	12
Totals	241		173	68				1	3	4	34	28	22	17	99	33
27. *Wood Workers.*																
Basket makers (F.)	84		62	22					16	15	39	14				
Bench hands	270		236	34									34	1	13	222
Bench hands, apprentices	24		24							2	3	7	6	5	1	
Box machine operators	75			75								30		45		
Box makers	131		1	130							4	102	17	5	3	
Cabinet makers	306		282	23	1								2	10	42	252
Cabinet makers, apprentices	18		15	3						1	11	4	2			
Coopers (hand)	121		32	89									2	15	79	25
Coopers (hand), helpers	58		8	50						6	4	40	8			
Coopers (machine)	92			92						6	10	4	23	16	32	1
Draughtsmen	24		21	3											2	22
Frame makers	22		22									2	6	8	6	
Glaziers	19		17	2											6	13
Lumber hands	552		70	482							9	29	36	72	125	281
Mill hands	584		422	161	1					15	23	38	170	59	81	198
Millwrights	15		13	2											1	14
Pattern makers	123		123									2	2	6	8	105
Pattern makers, apprentices	34		34						5	14	9	4		2		

TABLE I. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
27. *Wood Workers*—Continued.																
Planers	47		46	1									3	6	10	28
Sanders	10		10									1	1	1	3	4
Sash and door makers	35		35										4	7	8	16
Sawyers	68		54	14									11	3	17	37
Stair builders	59		59												6	53
Stickers	74		74											3	4	67
Tallymen	142		19	123							1	2	20	15	91	13
Varnishers and finishers	84		73	11							2	2	4	12	55	9
Wood turners	22		21	1											2	20
Yardmen	15		1	14									13	1	1	
Totals	3108		1774	1332	2				21	59	115	281	364	292	596	1380
28. *Miscellaneous.*																
Art plaster workers	23		23											9	10	4
Art plaster workers, apprentices	4		4							1	1	1	1			
Bag and burlap workers	14		2	12							6	4	3	1		
Bag machine operators (F.)	53		1	51	1				4	14	35					
Bag pilers and turners (F.)	30			30						30						
Bed spring makers	21		13	8							1	4	10	2	2	2
Casket coverers	26		26						1	2	2	1	6	6	8	
Cellarmen	64		19	43	2						1	7	26	17	7	6
Chauffeurs	26		9	4	13								5	12	2	7
Chemists	25		14	9	2								2	4	3	16
Coffee and spice workers	68		14	54					2	6	2	6	18	18	14	2
Coffee and spice workers (F.)	52		2	50						41	9	2				
Coffee roasters	8		3	5										4	4	
Engineers (stationary)	201		112	76	11	2						1	8	30	47	115
Firemen (stationary)	50		35	10	3		2				3	2	7	17	20	1
Flour millers	19		4	12	2	1								8	5	6
Flour mill hands	123		34	52	33	4				5	4	2	61	51		
Forewomen (F.)	93		49	44						1	14	25	21	10	4	18
Garage hands	73		35	18	20						2	2	18	29	16	6

Ice pullers and packers	32	7	9		10		6							15	9	7	1
Jewelers and silversmiths	124		16	108										12	24	33	55
Jewelers and silversmiths, ap'tices	54			54													
Jewelry and silver polishers	50		9	41				9	19	14	12						
Jewelry engravers	30		1	29				2	6	8	5	1	5	7	16		
Jewelry engravers, apprentices	9			9								1	4	9	16		
Labelers (F.)	98		85	13				2	4	3							
Laboratory hands	37		19	18				9	62	16	9	2					
Laboratory hands (F.)	19		2	17				4	11	8	7	3	2	2			
Managers and foremen	2665	150	1668	622	192	12	31	8	8	3							
Mosaic and terazzo workers	47		47							12	3	31	75	133	2411		
Nurserymen	45			21	24								22	24	1		
Paper box makers	186		6	180							24	12	2		3		
Paper box makers (F.)	169		33	136					15	4	6	137	21	2	1		
Paste factory hands	41		10	26	5			43	82	36	7	1					
Photograph workers	21		20	1							14	22	5				
Photograph workers (F.)	19		16	3				2	2		1	3	1	3	9		
Piano repairers and polishers	39		11	28				2	7	3	2		4	1			
Piano tuners	16		5	11					3	1	3	1	4	14	13		
Preserve and pickle packers	8		6	2										6	10		
Preserve and pickle packers (F.)	23		13	10							2	6					
Rectifiers	32		28	3	1				16	7							
Roofers	19		19									3	1	4	24		
Rubber factory hands	60		23	37									4		15		
Soda and mineral water bottlers	16		2	14					7	5	19	15	5	4	5		
Stone and marble cutters	107		106	1								11		5			
Stone and marble polishers	72		72											1	106		
Stone and marble setters	58		58										4	68			
Stone and marble setters, helpers	71		71										1	3	54		
Stone and marble workers	113		112	1								51	20				
Stone and marble workers, appren's	14		14								2	13	10	24	64		
Tent and awning machine operators (F.)	40		15	25				1		6	4	3					
Tent and awning workers	24		13	11					10	29		1					
Watchmakers	40		9	31					1		7	7	1	4	4		
Watchmakers, apprentices	24		3	21								4	8	10	18		
Watchmen	124		23	23	28	3	47	1	3	9	3	8					
Wine bottlers	26		22	1	3			1	1	2	17	66	29	6	2		
Yeast factory hands	38		22	16						6	3	10	5	2			
												21	9	8			
Totals	5583	157	2977	1991	350	22	86	1	93	363	250	212	638	493	522	3011	

TABLE II. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN FRANCISCO during the Fiscal Year 1909-10.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	2311	200	204	292	1264	264	87	------	56	260	643	587	133	275	252	105
Breweries and bottling works	308	------	273	18	17	------	------	------	------	------	5	2	44	80	137	40
Butcher shop and slaughterhouse employees	585	------	61	294	201	------	29	------	------	6	13	77	92	127	235	35
Candy, confectionery, and sugar workers	748	------	107	639	2	------	------	------	76	241	178	104	58	40	42	9
Cannery employees	962	------	2	183	762	------	15	------	225	352	262	99	23	1	------	------
Cigar and tobacco workers	334	------	210	112	12	------	------	------	7	107	16	24	33	10	127	10
Clothing, shoes, etc.	3659	------	1867	1709	77	6	------	35	249	618	701	885	318	245	345	263
Dairy employees	58	------	9	24	25	------	------	------	------	------	------	31	24	1	1	1
Electrical workers	363	------	361	2	------	------	------	------	6	24	14	31	55	27	68	138
Glass workers	621	------	162	459	------	------	------	------	1	23	196	155	15	4	3	224
Laborers, general	2165	8	751	1117	283	------	6	------	1	17	172	1026	756	151	36	6
Laundry workers	2190	5	1277	593	203	92	20	------	3	510	809	327	179	268	65	29
Machine and repair shops, iron and steel mills	4036	115	3660	205	56	------	------	1	86	183	114	370	549	555	1666	512
Metal workers	258	------	146	112	------	------	------	------	4	12	23	21	33	22	109	34
Plumbers, pipe fitters	304	------	297	7	------	------	------	------	1	2	5	9	56	39	18	174
Printing trades	1832	45	1742	45	------	------	------	------	64	85	200	133	177	100	437	636
Sheet metal workers	953	------	602	351	------	------	------	------	5	163	61	137	59	56	81	391
Ship builders, riggers, etc.	261	------	261	------	------	------	------	------	------	9	6	10	52	16	22	146
Soap and candle workers	40	------	1	39	------	------	------	------	------	6	9	8	11	1	2	3
Store and office employees	21464	1455	12962	5314	1562	17	154	9	948	1886	2338	2519	3460	2665	1731	5908
Structural iron workers	623	------	219	404	------	------	------	------	6	21	17	43	112	110	175	139
Tannery employees	529	------	------	529	------	------	------	------	------	9	17	57	420	18	8	------
Textile workers.*																
Teamsters, hostlers, etc.	4210	2	915	1213	1520	232	328	------	1	51	58	207	794	1572	1206	321
Trunks, harness, etc.	250	------	34	213	3	------	------	------	4	35	18	21	48	74	48	2
Upholsterers, carpet layers, etc.	241	------	173	68	------	------	------	1	3	4	34	28	22	17	99	33
Wood workers	3108	------	1774	1332	2	------	------	------	21	59	115	281	364	292	596	1380
Miscellaneous	5583	157	2977	1991	350	22	86	1	93	363	250	212	638	493	522	3011
Totals	57996	1987	31047	17265	6339	633	725	47	1860	5046	6274	7404	8525	7259	8031	13550

*No employees considered.

TABLE III. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF LOS ANEGLES during the Fiscal Year 1909-10.
(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
1. *Bakery and Restaurant Employees.*																
Bakers	179	------	30	24	118	7	------	------	------	------	2	23	42	80	18	14
Bakers, apprentices	14	------	3	1	10	------	------	------	------	5	6	3	------	------	------	------
Bakers, helpers	58	------	5	14	38	1	------	------	------	14	29	14	1	------	------	------
Cooks	293	1	17	9	206	19	41	------	------	4	26	49	69	87	33	25
Cooks (F.)	54	9	9	11	25	------	------	------	------	5	16	19	8	4	1	1
Cooks, helpers	61	2	7	1	44	1	6	------	2	13	40	5	------	1	------	------
Kitchen help	286	1	23	9	184	30	39	------	1	144	113	28	------	------	------	------
Kitchen help (F.)	78	7	30	------	32	6	3	------	7	64	2	5	------	------	------	------
Stewards	10	------	------	------	10	------	------	------	------	------	------	------	2	1	------	7
Waiters	530	46	31	13	355	32	53	------	25	81	279	124	19	2	------	------
Waitresses (F.)	638	161	170	36	251	13	7	------	134	296	201	5	2	------	------	------
Totals	2201	227	325	118	1273	109	149	------	169	626	714	275	143	175	52	47
2. *Breweries and Bottling Works.*																
Beer bottlers	123	------	123	------	------	------	------	------	------	------	------	------	39	83	1	------
Brewers	33	------	28	------	5	------	------	------	------	------	------	------	------	------	27	6
Brewery workmen	13	------	8	1	4	------	------	------	------	------	------	1	------	------	12	------
Coopers	9	------	9	------	------	------	------	------	------	------	------	------	------	------	9	------
Totals	178	------	168	1	9	------	------	------	------	------	------	1	39	83	49	6
3. *Butcher Shop and Slaughterhouse Employees.*																
Coolermen	16	------	------	------	9	6	1	------	------	------	------	1	6	8	1	------
Killers and dressers	32	------	------	6	24	2	------	------	------	------	------	------	24	6	------	2
Meat cutters	217	------	------	21	104	74	18	------	2	1	14	30	59	74	30	7
Meat packers and canners	56	------	------	4	52	------	------	------	7	8	16	9	14	2	------	------
Meat packers and canners (F.)	13	------	------	2	11	------	------	------	5	5	------	2	------	1	------	------
Sausage makers	56	------	------	2	47	6	1	------	------	1	10	11	19	9	3	3
Slaughterhouse workmen	8	------	------	------	8	------	------	------	------	------	1	3	2	1	------	1
Totals	398	------	------	35	255	88	20	------	14	15	41	56	124	101	34	13

TABLE III. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF LOS ANGELES during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.							
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
4. *Candy, Confectionery, and Sugar Workers.*																
Biscuit bakers	61		1	30	30							18	10	11	21	1
Biscuit bakers, apprentices	5			5						1	4					
Biscuit bakers, helpers	24				24					8	6	8	2			
Biscuit bakers, helpers (F.)	38			36	2				1	37						
Biscuit packers	38				38					20	10	6		1	1	
Biscuit packers (F.)	168			168					44	100	21	3				
Candy makers	63			19	44				2			11	17	14	3	16
Candy makers, helpers	46			17	29				1	17	19	4	3	1	1	
Candy makers, helpers (F.)	26			6	20				1	11	12	2				
Cream dippers (F.)	30			19	11				4	7	16	3				
Confectionery packers	89				89					45	22	16	6			
Confectionery packers (F.)	290			285	5				103	128	56	3				
Ice cream makers	7				7						1		3		1	2
Ice cream makers, helpers	5				5						1	4				
Soda dispensers	55			12	41	2					4	6	24	13	7	1
Totals	945		1	597	345	2			156	374	172	84	65	40	34	20
5. *Cannery Employees.*																
Cannery workers	65			39	26					5		40	8	12		
Cannery workers (F.)	32			25	7					29	3					
Can sealers	12			12												12
Labelers (F.)	40		6	14	20					40						
Preparers (F.)	134			64	70					78	23	22	11			
Preservers	6				6							2	3	1		
Preservers (F.)	51			51					40	9	1	1				
Totals	340		6	205	129				40	161	27	65	22	13		12

6. *Cigar and Tobacco Workers.*																
Cigar makers	105		105								3	7	95			
Cigar makers (F.)	18		18							1	7	7	3			
Cigar packers	4		4								1		1	2		
Cigar packers (F.)	4		4								1			3		
Tobacco strippers	6		6						5	1						
Tobacco strippers (F.)	32		32						27	4	1					
Totals	169		169						32	6	13	14	99	5		
7. *Clothing, Shoes, Etc.*																
Alteration hands	568		378	184	6			2	16	43	274	147	60	17	4	5
Boot and shoe workers	52		7	29	16					1	1	12	14	13	6	5
Boot and shoe workers (F.)	8			7	1					1	3	4				
Bushelmen	132		27	59	46						18	6	16	60	14	18
Garment workers	29		23	6						1		3	6	9	4	6
Glove cutters	11			11							2	9				
Glove makers (F.)	13			13						6	4	3				
Hat makers (F.)	109		77	27	5			2	13	36	17	13	23	5		
Machine operators (F.)	487		423	63	1				33	145	183	67	46	13		
Milliners (F.)	177		102	65	10				9	22	43	43	15	16	9	20
Milliners, apprentices (F.)	55		32	20	3			25	23	7						
Seamstresses (F.)	404		91	311	2				6	75	147	94	44	15	9	14
Seamstresses, apprentices (F.)	37		6	31				7	14	16						
Tailors	469		91	365	13							7	55	130	169	108
Tailors, apprentices	38		6	31	1					1	7	7		10	13	
Tailors, cutters	42		9	24	9									2		40
Tailors, cutters, helpers	28		10	14	4					3	5	2	3	12	1	2
Tailors, finishers (F.)	221		82	133	6				10	32	86	62	24	6	1	
Totals	2880		1364	1393	123			36	124	389	790	479	306	308	230	218
8. *Dairy Employees.*																
Butter makers	3				3											3
Creamery hands	106		92	2	12					1	1	86	17	1		
Totals	109		92	2	15					1	1	86	17	1		3
9. *Electrical Workers.*																
Electricians	168	1	123	22	22							8	38	45	62	15
Electricians, apprentices	36	1	19	12	4				2	10	8	15	1			
Electrical workers	62		42	20							5	3	10	19	25	
Electrical workers, helpers	23		12	11						12	2	9				
Totals	289	2	196	65	26				2	22	15	35	49	64	87	15

TABLE III. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF LOS ANGELES during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
10. *Glass Workers.*																
Art glass workers	37		37								2	3	4	7	14	7
Art glass workers, apprentices	14	1	12	1				2	1	7	2	2				
Bevelers	13		10	3								2	1	5	5	
Designers	4	1	3													4
Totals	68	2	62	4				2	1	7	4	7	5	12	19	11
11. *Laborers—General.*																
Laborers	2913	4	394	1087	1043	383	2		5	37	345	1808	421	66	230	1
Totals	2913	4	394	1087	1043	383	2		5	37	345	1808	421	66	230	1
12. *Laundry Workers, Dyers, Etc.*																
Dyers and cleaners	47			46	1					2	7	4	19	9	3	3
Dyers and cleaners (F.)	25			25					2	4	8	5	4	1	1	
Ironers, hand	53			44	9					15	12	15	6	4	1	
Ironers, hand (F.)	371			203	168				3	67	205	70	24	2		
Ironers, machine	13			9	4						2	1	5	3		2
Ironers, machine (F.)	212		7	136	69				1	118	80	12	1			
Manglers	56			28	28					37	6	7	2	4		
Manglers (F.)	449			266	183				3	441	4		1			
Markers and distributors	157	1		88	68					12	16	20	79	23	7	
Markers and distributors (F.)	86			65	21					11	12	32	23	7	1	
Pressers	55		6	48	1						3	8	24	17	2	1
Pressers (F.)	85			85						28	18	39				
Shirt finishers	15			3	12					3	4	3	3	1	1	
Shirt finishers (F.)	73			37	36				1	35	22	14	1			
Shirt folders (F.)	21			12	9				1	18	1		1			
Starchers	24			12	12					2	9	3	8	2		
Starchers (F.)	61			34	27				1	29	21	10				
Washroom hands	138		1	69	68					23	20	34	34	21	5	1
Washroom hands (F.)	18			9	9					14	2	2				
Totals	1959	1	14	1219	725				12	859	452	279	235	94	21	7

13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	114		5	70	39								16	31	34	33
Blacksmiths, apprentices	8		2	4	2				3	2		3				
Blacksmiths, helpers	143		1	85	57					3	10	59	33	35	3	
Boiler makers	59		18	24	17								13	32	9	5
Boiler makers, apprentices	9			6	3				1	2		6				
Boiler makers, helpers	86		2	58	26					2	12	71			1	
Casting chippers	22			10	12							4	18			
Core makers	31			21	10						1	5	4	11	8	2
Core makers, apprentices	6			6						3	3					
Cupolamen	18			18								12	5		1	
Draughtsmen	41		5	36							1	1	2	12	10	15
Draughtsmen, apprentices	13		2	11					3	6	3	1				
Foundry helpers	254			104	150				1		11	86	81	29	11	35
Machine hands	91		4	50	37					10	26	19	9	30	7	
Machinists	922	1	89	611	220		1				2	53	153	273	368	73
Machinists, apprentices	123	1	3	77	42			4	29	42	31	11	5	1		
Machinists, helpers	297		11	206	80				2	15	45	166	52	16	1	
Molders	173			142	31							5	9	70	65	24
Molders, apprentices	15			15					1	6	2	1	5			
Molders, helpers	52			52							1	39	8	4		
Riveters	22			22								22				
Stove mounters	6			1	5								6			
Totals	2515	2	142	1639	731		1	4	40	91	148	564	419	544	518	187
14. *Metal Workers.*																
Brass finishers	12		1	11							3		4	4	1	
Brass workers	47		24	23						1		8	6	15	16	1
Brass workers, helpers	29		16	13					3	16	4	6				
Fixture makers	38		38								1		3	14	20	
Platers	19		19									2	5	3	6	3
Polishers	27		16	11								3		16	8	
Polishers, helpers	12		9	3					1	7	3	1				
Totals	184		123	61					4	24	11	20	18	52	51	4
15. *Plumbers, Pipe Fitters, Etc.*																
Pipe fitters	39		11	17	10		1					2	12	12	8	5
Pipe fitters, helpers	38		2	32	4					6	5	27				
Plumbers	115	1	114									1	5	12	52	45
Plumbers, helpers	27		27						7	9	1		5	5		
Steam fitters	9		8	1										1	3	5
Steam fitters, helpers	11		11									6	4	1		
Totals	239	1	173	50	14		1		7	15	6	36	26	31	63	55

TABLE III. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF LOS ANGELES during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
16. *Printing Trades.*																
Bindery girls (F.)	188		159	29					39	118	26	5				
Bookbinders	63		54	9					1	2	2	4	12	22	19	1
Bookbinders, apprentices	36		28	8					1	27	8					
Compositors	284		250	32	2					1	3	3	17	58	38	164
Compositors (F.)	8		3	5								5	3			
Compositors, apprentices	38	1	32	5					6	12	8	7	5			
Electrotypers	5			5										1	2	2
Electrotypers, apprentices	6			6						4	2					
Engravers	72		48	24									6	6	21	39
Engravers, apprentices	17		12	5					2	7	4	4				
Linotype operators	94	24	63	7							1	1	2	3	3	84
Linotype operators, apprentices	5		5							2	1	1	1			
Lithographers	20		14	6									2	1	3	14
Lithographers, apprentices	7		4	3					2	2	1	1	1			
Paper cutters	21		10	11						1		1	6	9	4	
Press feeders	161		91	47	23				3	28	39	63	28			
Press feeders (F.)	18		16	2					1	6	7	4				
Pressmen	179	34	107	38						1	6	31	25	36	52	28
Pressmen, apprentices	16	1	14	1					3	4	1	2	6			
Proofreaders	25	6	18	1							1	3	1	3	7	10
Proofreaders (F.)	19	3	14	2						1	1		11		3	3
Stereotypers	26		25	1									3	1	9	13
Stereotypers, helpers	12		12					3			4	2	2		1	
Totals	1320	69	979	247	25			3	58	216	115	137	131	140	162	358
17. *Sheet Metal Workers.*																
Can makers	79			78	1					6	5	10	45	13		
Can makers (F.)	20			20							20					
Sheet metal workers	221		118	101	2						3	12	48	89	63	6
Sheet metal workers, apprentices	15		11	4					6	4	5					
Sheet metal workers, helpers	37		10	27						9	10	16	2			
Tinners	36		18	17	1							2	6	14	12	2
Totals	408		157	247	4				6	19	43	40	101	116	75	8

18. *Ship Builders, Riggers, Etc.**																
19. *Soap and Candle Workers.**																
20. *Store and Office Employees.*																
Bookkeepers	669	5	243	316	97	2	6		1	8	19	45	132	142	104	218
Bookkeepers (F.)	494	14	196	233	49		2		6	63	90	124	122	44	29	16
Cash boys	85		51	34					70	9	5	1				
Cash girls (F.)	310		233	77					275	32	3					
Cashiers	137		43	57	35	2				1	14	10	15	17	12	68
Cashiers (F.)	322	1	95	164	56	6			26	131	91	40	19	8	1	6
Collectors	156	4	55	75	22				1	6	14	19	36	46	16	18
Drapers	46		21	18	7					7	5	6	4	9	1	14
Drug clerks	39			4	35									8	23	8
Elevator operators	57		33	15	9					1	35	17	3	1		
Errand boys	516	15	225	229	47			4	162	304	38	8				
Floor walkers	58		34	23	1							6	36	9	5	2
Office clerks	999		366	520	98	13	2	1	7	95	92	133	217	170	108	176
Office clerks (F.)	579	1	326	185	67			3	27	166	156	92	82	27	9	17
Porters and packers	1105	7	239	486	357	3	13		11	70	227	431	286	49	16	15
Salesmen	3721	12	1335	1579	751	26	18		4	84	163	395	725	679	424	1247
Saleswomen (F.)	2249	2	1297	835	115			7	182	841	593	342	178	68	15	23
Shipping clerks	534		109	290	135				3	14	50	108	160	117	44	38
Solicitors	209	1	68	130	10					2	2	22	37	39	30	77
Stenographers (F.)	541	13	294	203	31					51	132	156	143	48	6	5
Stock clerks	641	2	206	344	78	11			23	96	139	156	127	55	32	13
Stock clerks (F.)	77		55	22					35	28	9	3	1	1		
Telephone operators (F.)	68		20	39	9					24	28	12	4			
Wrappers	106		97	8	1			8	8	10	7	9	55	9		
Wrappers (F.)	150	8	112	28	2				91	50	9					
Totals	13868	85	5753	5914	2012	63	41	23	932	2093	1921	2135	2382	1546	875	1961
21. *Structural Iron Workers.*																
Architectural iron workers	66			66									38	21	7	
Architectural iron workers, helpers	39			39						8	6	23	2			
Structural iron workers	142			18	124								76	49	8	9
Structural iron workers, helpers	275			22	253						2	213	60			
Totals	522			145	377					8	8	236	176	70	15	9
22. *Tannery Employees.**																

*No employees considered.

TABLE III. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF LOS ANGELES during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
23. *Textile Workers.**																
24. *Teamsters, Hostlers, Etc.*																
Drivers—																
Bakery	73			20	39	2	12				4	14	36	11	6	2
Bottle	46			44	2						1	1	11	28	5	
Brewery (keg)	21		14	7										18	3	
Construction	141			64	77						1	119	17	2	2	
Draying	395			26	312	57					2	129	238	25	1	
General delivery	834		97	415	301	4	17			17	89	397	270	47	7	7
Grocery	70		1		68		1		1	3	13	43	10			
Ice	153		21	49	83						13	12	28	16	81	3
Laundry	272	7	1	191	73					4	18	58	61	65	14	52
Lumber	206		4	197	5					1	11	60	80	47	7	
Meat	67		2	20	12	30	3			1	4	20	40	2		
Milk	111		82	18	11							21	30	60		
Horseshoers	10			6	4							2	1	3	2	2
Stablemen and hostlers	236		14	45	87	13	77			2	12	107	83	20	10	2
Warehousemen	178		10	112	56					3	5	76	74	16	2	2
Totals	2813	7	246	1214	1130	106	110		1	31	173	1059	979	360	140	70
25. *Trunks, Harness, Etc.*																
Collar makers	16			16								3	4	8	1	
Collar makers, apprentices	11			11						1	10					
Harness makers	40		1	39								9	22	4	5	
Harness makers, apprentices	32			32						17	15					
Leather workers	26		4	22							2	2	12	8	2	
Leather workers (F.)	17		4	13					4	7	5	1				
Saddle makers	9			9									4	3	2	
Trunk liners (F.)	6			6						2	4					
Trunk makers	42		3	39							5	7	15	15		
Trunk makers, apprentices	6		1	5					2	4						
Totals	205		13	192					6	31	41	22	57	38	10	

26. *Upholsterers, Carpet Layers, Etc.*																
Carpet layers	45		7	25	13						1	2	7	15	18	2
Carpet sewers (F.)	18		1	17						2	10	6				
Drapery hangers	16			16						1	1	1	3	6	3	1
Mattress makers	39		1	38								12	7	8	9	3
Mattress makers, apprentices	7		5	2					2	4	1					
Shade makers	14		2	8	4					1	3	2	6	1		1
Tick sewers (F.)	34		12	22						5	12	17				
Upholsterers	32		10	22							2	5	1	9	14	1
Totals	205		38	150	17				2	13	30	45	24	39	44	8
27. *Wood Workers.*																
Bench hands	149		36	113							2	24	10	68	43	2
Bench hands, apprentices	14		4	10						3	1	3	4	3		
Box makers	12		1	2	9						3	3	5	1		
Cabinet makers	227		74	147	6						2	14	18	88	101	4
Cabinet makers, helpers	19		13	6						1	4	8	4	2		
Carriage makers	29		2	26	1								8	11	9	1
Coopers	36		1	26	9						1	7	16	9	3	
Draughtsmen	18		10	8							1	1	2		4	10
Floor layers and finishers	61		61									61				
Frame makers	26		1	19	6						1	4	10	9	1	1
Glaziers	83		24	41	18					4	7	6	30	20	12	4
Lumber hands	1199		4	1114	81					4	15	262	551	286	81	
Mill hands	604		14	582	8					53	109	176	178	63	22	3
Millwrights	94			91	3									47	37	10
Pattern makers	55		10	28	17							1	5	6	24	19
Pattern makers, apprentices	30			14	16					8	9	3	4	6		
Planers	71		3	68						2	3	8	16	11	30	1
Sanders	43		12	31						5	9	12	7	6	4	
Sash and door makers	113		7	106						5	15	26	28	30	8	1
Saw filers	14			14									1	1	6	6
Sawyers	83		7	76						1	6	19	19	23	13	2
Stair builders	5			5										4	1	
Stickers	86		6	80						6	2	7	8	24	39	
Tallymen	108			108								6	37	40	14	11
Varnishers and finishers	138		29	89	20					1	3	37	38	39	7	13
Wood carvers	7		6	1											6	1
Wheelwrights	10			10										4	6	
Wood turners	59		3	56								1	3	48	6	1
Yardmen	57		1	56						2	3	43	9			
Totals	3450		329	2927	194					95	196	732	1011	849	477	90

TABLE. III. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF LOS ANGELES during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
28. *Miscellaneous.*																
Art plaster workers	5		5												5	
Bedspring makers	17			17						1	1	11	3	1		
Broom and brush makers	39		14	25						4	7	6	13	9		
Cellarman	9		1	4	4							1	3	5		
Chauffeurs	18		1	10	7							1	6	7	3	1
Chemists	12		6	4	2								1	2	4	5
Engineers	201		52	58	62	4	25					7	36	57	50	51
Firemen	42		6	14	13	4	5			1	1	9	19	9	3	
Flour millers	17		4	7	2		4						2	7	2	6
Flour mill hands	82			73	9					1	3	4	66	7	1	
Forewomen (F.)	48		22	21	5					1	4	11	6	7	5	14
Garage help	24			8	15		1			1	5	8	4	5	1	
Glue workers	10			4	6						5	3	1	1		
Ice pullers and packers	27						27						26	1		
Jewelers and silversmiths	81		22	50	9						3	7	8	17	20	26
Jewelers and silversmiths, ap'tices	20			20					4	11	1	4				
Jewelry and silver polishers	15			15							2	1	5	5	1	1
Jewelry engravers	11			11										4		7
Labelers (F.)	51	1	11	36	3				15	29	5	2				
Laboratory hands	13		3	6	4					2	2		5	2	2	
Laboratory hands (F.)	22		5	17					7	12	3					
Managers and foremen	1611		592	704	266	24	25					10	68	140	162	1231
Paper box makers	23		2	21					10	1	2	4	4	2		
Paper box makers (F.)	81		34	47					24	36	14	7				
Paste factory hands	23		11	12							13	8	2			
Photographic workers	18	1	3	13	1					2	1	1	2	4	1	7
Photographic workers (F.)	14		1	11	2					4	5	1	2	2		
Pickle and olive sorters (F.)	57			56	1					56	1					
Picture framers	18		2	16							2	3	11	1		1
Potters	7			4	3								1	4	2	
Pottery workmen	43			19	20		4					1	18	5	15	2	2
Preserve and pickle factory hands	102			3	89	10				1	76	15	5	3	1	1
Preserve and pickle packers	34			2	32					1	12	13	8			

Preserve and pickle packers (F.)	117	------	2	84	31	------	------	------	------	92	24	1	------	------	------	------
Reed and rattan workers	46	------	------	31	15	------	------	------	------	------	9	8	13	10	6	------
Roofers	20	------	------	20	------	------	------	------	------	------	------	------	5	13	2	------
Rubber factory hands	14	------	2	11	1	------	------	------	------	------	3	3	------	4	3	1
Stone and marble cutters	39	------	37	2	------	------	------	------	------	------	------	2	------	6	19	12
Stone and marble setters	57	------	57	------	------	------	------	------	------	------	------	------	------	2	35	20
Stone and marble setters, helpers	61	------	61	------	------	------	------	------	------	2	2	55	2	------	------	------
Stone and marble workers	25	------	25	------	------	------	------	------	------	------	------	2	8	8	7	------
Tent and awning machine operators (F.)	75	------	3	72	------	------	------	------	3	47	18	7	------	------	------	------
Tent and awning workers	39	------	1	38	------	------	------	------	------	6	4	11	11	6	1	------
Watchmakers	38	------	2	36	------	------	------	------	------	------	------	------	1	6	8	23
Watchmen	89	------	6	21	14	1	47	------	------	1	7	23	39	16	3	------
Vulcanizers	25	------	7	18	------	------	------	------	------	------	5	2	8	8	1	1
Totals	3440	2	1000	1641	616	43	138	------	63	312	241	269	399	396	350	1410

TABLE IV. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SACRAMENTO during the Fiscal Year 1909-10—Cont.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.							
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	2201	227	325	118	1273	109	149	------	169	626	714	275	143	175	52	47
Breweries and bottling works	178	------	168	1	9	------	------	------	------	------	------	1	39	83	49	6
Butcher shop and slaughterhouse employees	398	------	------	35	255	88	20	------	14	15	41	56	124	101	34	13
Candy, confectionery, and sugar workers	945	------	1	597	345	2	------	------	156	374	172	84	65	40	34	20
Cannery employees	340	------	6	205	129	------	------	------	40	161	27	65	22	13	------	12
Cigar and tobacco workers	169	------	169	------	------	------	------	------	32	6	13	14	99	5	------	------
Clothing, shoes, etc.	2880	------	1364	1393	123	------	------	36	124	389	790	479	306	308	230	218
Dairy employees	109	------	92	2	15	------	------	------	------	1	1	86	17	1	------	3
Electrical workers	289	2	196	65	26	------	------	------	2	22	15	35	49	64	87	15
Glass workers	68	2	62	4	------	------	------	2	1	7	4	7	5	12	19	11
Laborers, general	2913	4	394	1087	1043	383	2	------	5	37	345	1808	421	66	230	1
Laundry workers, dyers, etc.	1959	1	14	1219	725	------	------	------	12	859	452	279	235	94	21	7
Machine and repair shops, iron and steel mills	2515	2	142	1639	731	------	1	4	40	91	148	564	419	544	518	187
Metal workers	184	------	123	61	------	------	------	------	4	24	11	20	18	52	51	4
Plumbers, pipe fitters, etc.	239	1	173	50	14	------	1	------	7	15	6	36	26	31	63	55
Printing trades	1320	69	979	247	25	------	------	3	58	216	115	137	131	140	162	358
Sheet metal workers	408	------	157	247	4	------	------	------	6	19	43	40	101	116	75	8
Shipbuilders, riggers, etc.*																
Soap and candle workers.*																
Store and office employees	13868	85	5753	5914	2012	63	41	23	932	2093	1921	2135	2382	1546	875	1961
Structural iron workers	522	------	------	145	377	------	------	------	------	8	8	236	176	70	15	9
Tannery employees.*																
Textile workers.*																
Teamsters, hostlers, etc.	2813	7	246	1214	1130	106	110	------	1	31	173	1059	979	360	140	70
Trunks, harness, etc.	205	------	13	192	------	------	------	------	6	31	41	22	57	38	10	------
Upholsterers, carpet layers, etc.	205	------	38	150	17	------	------	------	2	13	30	45	24	39	44	8
Wood workers	3450	------	329	2927	194	------	------	------	------	95	196	732	1011	849	477	90
Miscellaneous	3440	2	1000	1641	616	43	138	------	63	212	241	269	399	396	350	1410
Totals	41618	402	11744	19153	9063	794	462	68	1674	5445	5507	8484	7248	5143	3536	4513

*No employees considered.

TABLE V. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF OAKLAND during the Fiscal Year 1909-10.

(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
1. *Bakery and Restaurant Employees.*																
Bakers	75		4	34	37									8	44	23
Bakers, apprentices	18		3	8	7					2	3	11	2			
Bakers, helpers	9			5	4					4	2	1	2			
Cooks	98	1	3	6	85	2	1				1	3	14	34	24	22
Cooks, helpers	55			3	51		1			5	25	19	3	3		
Kitchen help	64			12	49		3			12	43	9				
Kitchen help (F.)	6		6							4	2					
Stewards	9			1	8							1		7		1
Waiters	164	3		15	145		1			3	56	88	17			
Waitresses (F.)	67	1	19	43	13					10	46	4	7			
Totals	565	5	26	127	399	2	6			40	178	136	45	52	68	46
2. *Breweries and Bottling Works.*																
Beer bottlers	24		24										2	20	1	1
Brewers	23		23												14	9
Brewery workmen	8		7		1								1	1	5	1
Totals	55		54		1								3	21	20	11
3. *Butcher Shop and Slaughterhouse Employees.*																
Coolermen	4			1	3									1	1	2
Meat cutters	84			11	69		4				1	1	3	48	28	3
Sausage makers	21			5	16									11	7	3
Totals	109			17	88		4				1	1	3	60	36	8

TABLE V. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF OAKLAND during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
4. *Candy, Confectionery, and Sugar Workers.*																
Candy makers	10		1	9								2		1	5	2
Candy makers, helpers	11			11						4	1	2	4			
Confectionery packers (F.)	19			19					2	15	2					
Cream dippers (F.)	27			27					2	1	23	1				
Ice cream makers	6		1	5									2	1	2	1
Soda dispensers	8		1	7							2			5	1	
Totals	81		3	78					4	20	28	5	6	7	8	3
5. *Cannery Employees.*																
Canners (F.)	261				176		85	4	6	20	115	106	10			
Cannery workers	140				69		71				99	27	14			
Labelers (F.)	19				13		6			5	11	3				
Preparers	40						40			6	20	5	3	6		
Preparers (F.)	546				421		125	6	95	70	110	150	15	50	25	25
Totals	1006				679		327	10	101	101	355	291	42	56	25	25
6. *Cigar and Tobacco Workers.**																
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	204		66	138				2	9	17	92	58	10	8	7	1
Bushelmen	28		1	25	2							1		3	17	7
Garment cutters	3		2	1										2	1	
Garment fitters (F.)	18			18								1	9	4	2	2
Glove cutters	13			13									1	9	3	
Glove cutters, apprentices	6			6					1	3	2					
Glove workers (F.)	36		20	16						13	20	1	1	1		

Hat makers (F.)	49		25	24						26	14	3	4	2		
Hat makers, apprentices (F.)	18		12	6				12	4	2						
Machine operators	4		4											1	2	1
Machine operators (F.)	34		33	1							30	4				
Milliners (F.)	31		11	20						9	1	5	1	3	4	8
Milliners, apprentices (F.)	21		1	20				6	15							
Seamstresses (F.)	19		10	9						1	10	5	2			1
Tailors	197		11	186									5	55	61	76
Tailors, cutters	35		1	34												35
Tailors, finishers (F.)	64		1	63						10	3	33	17			1
Totals	780		198	580	2			20	29	81	172	111	50	88	97	132
8. *Dairy Employees.*																
Butter makers	13		2	9	2								5	2	1	5
Can washers	7		4	3									7			
Totals	20		6	12	2								12	2	1	5
9. *Electrical Workers.*																
Electricians	35		35													35
Electricians, apprentices	12		12							2	1	1	6	2		
Electrical workers	23		22	1									2		4	17
Totals	70		69	1						2	1	1	8	2	4	52
10. *Glass Workers.**																
11. *Laborers—General.*																
Laborers	858		57	644	154		3			1	115	321	340	80	1	
Totals	858		57	644	154		3			1	115	321	340	80	1	
12. *Laundry Workers, Dyers, Etc.*																
Dyers and cleaners	10			10								1	5	3	1	
Ironers, hand	27			22	5						4	9	7	6	1	
Ironers, hand (F.)	98			95	3					5	28	58	7			
Ironers, machine	8			7	1				1		1	3	2			1
Ironers, machine (F.)	71			71						3	56	11	1			
Manglers	6			6						5				1		
Manglers (F.)	136			136						117	19					
Markers and distributors	59			59						1	2		8	44	2	2
Markers and distributors (F.)	21			21						1	3	7	5	5		

*No employees considered.

TABLE V. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF OAKLAND during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.							
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
12. *Laundry Workers, Dyers, Etc.*—Cont-d.																
Pressers	26		2	24								4	17	3	2	
Pressers (F.)	38			38						6	26	6				
Starchers	17			17						2		4	8	2	1	
Starchers (F.)	47			47						21	19	7				
Washroom hands	55		6	48	1						2	12	19	17	2	3
Totals	619		8	601	10				1	161	160	122	79	81	9	6
13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	17		13	4										3	9	5
Blacksmiths, helpers	20		15	5						1	1		4	13	1	
Boiler makers	8		8												3	5
Boilermakers, helpers	6		6									1	4	1		
Casting chippers	9		8	1									6	3		
Core makers	16		11	5							1			3	11	1
Cupolamen	8		6	2									2	2	4	
Draughtsmen	9		9											2	2	5
Draughtsmen, apprentices	8		8							5		3				
Flask makers	4		4										1	2	1	
Foundry help	104		89	15							27	39	38			
Machine hands	140		78	38	24					11	18	18	20	7	63	3
Machinists	200		171	28	1						1		3	21	166	9
Machinists, apprentices	64		62	2				1	17	18	16	12				
Machinists, helpers	39		38	1						1	1	12	23		2	
Molders	53		38	15											53	
Molders, apprentices	13		10	3						2	8	3				
Molders, helpers	32		24	8								2	30			
Rolling mill workers	72			72							7		4	25		36
Totals	822		598	199	25			1	17	38	80	90	135	82	315	64

14. *Metal Workers.*																
Brass finishers	3		1	2									2			
Brass workers	11		10	1						2		1		1	4	3
Coppersmiths	2		2													2
Platers	2		2										1	1		
Polishers	3		3								1	1		1		
Totals	21		18	3						2	1	2	3	4	4	5
15. *Plumbers, Pipe Fitters, Etc.*																
Plumbers	29		27	2									4	6	7	12
Plumbers, helpers	13		13							1	2		10			
Totals	42		40	2						1	2		14	6	7	12
16. *Printing Trades.*																
Bindery girls (F.)	22		22							6	9	7				
Bookbinders	14		14										1		5	8
Compositors	39		39												1	38
Compositors, apprentices	14		14						1	4	3	1	3	2		
Engravers	13		13												2	11
Engravers, apprentices	4		4						1		2		1			
Linotype operators	23	1	22													23
Press feeders	14		13	1						1		4	4	2	2	1
Press feeders (F.)	4		4								2	2				
Pressmen	31		30	1										1	13	17
Pressmen, apprentices	8		8					1	1		3	2		1		
Proofreaders	3		3													3
Proofreaders (F.)	4		4							1	1	2				
Stereotypers	7		7													7
Totals	200	1	197	2				1	3	12	20	18	9	6	23	108
17. *Sheet Metal Workers.*																
Sheet metal workers	7		7													7
Sheet metal workers, helpers	10		10							1	1		1	7		
Tinners	7		7													7
Totals	24		24							1	1		1	7		14
18. *Ship Builders, Riggers, Etc.**																
19. *Soap and Candle Workers.**																

*No employees considered.

TABLE V. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF OAKLAND during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
20. *Store and Office Employees.*																
Bookkeepers	207		129	48	30				1	1	5	5	12	22	47	14
Bookkeepers (F.)	278	4	139	120	14	1			6	14	48	66	61	44	27	12
Cash boys	25		25						25							
Cash girls (F.)	44		44						43	1						
Cashiers	25		13	6	6							4	1	3	1	16
Cashiers (F.)	125		59	52	14				9	60	25	14	10	1	3	3
Collectors	81		39	40	2					1	3	3	18	30	6	20
Drapers	11		2	4	5					3	2	1		1	1	3
Drug clerks	22			4	15	3									9	13
Elevator operators	7		1	6						6	1					
Errand boys	192	23	59	101	9			4	74	105	8	1				
Floor walkers	17		16	1									2	10	3	2
Office clerks	160	1	71	76	12					3	16	14	28	36	22	41
Office clerks (F.)	91		40	49	2				3	23	26	20	15	2	2	
Porters and packers	271		115	120	36				4	18	26	47	110	53	6	7
Salesmen	1115	1	509	487	112	2	4		3	19	34	43	227	171	151	467
Saleswomen (F.)	668		361	278	29			1	47	232	181	87	81	12	15	12
Shipping clerks	98		55	32	11					6	11	9	21	20	18	13
Solicitors	20		10	2	8									3	9	8
Stenographers (F.)	146	5	92	48	1				3	16	39	36	32	16	3	1
Stock clerks	61	1	32	26	2				7	11	12	7	9	7	3	5
Stock clerks (F.)	8		5	3						3		3	2			
Telephone operators (F.)	4		2	2						2	2					
Wrappers	15		7	4	4				1	4	1	7	2			
Wrappers (F.)	36		34	2					31	5						
Totals	3727	35	1859	1511	312	6	4	5	257	533	440	367	631	431	326	737
21. *Structural Iron Workers.*																
Architectural iron workers	7		7											2		5
Structural iron workers	34		34										2	7	9	16
Structural iron workers, ap'tices	7		7							1	2	4				
Structural iron workers, helpers	20		20							5	4	3	8			
Totals	68		68							6	6	7	10	9	9	21

22. *Tannery Employees.*																
Tanners	30			30									30			
Totals	30			30									30			
23. *Textile Workers.**																
24. *Teamsters, Hostlers, Etc.*																
Drivers—																
Bakery	33			5	26	2				2	1		4	12	14	
Bottle	28		8	11	9								2	8	18	
Brewery (keg)	17		7	3	7										5	12
Construction	85		1	84								1	70	12	2	
Draying	102		2	3	67		30					1	1	16	81	3
General delivery	283		45	142	95		1			9	8	16	81	130	33	6
Grocery	47		5	20	22					4	1	16	26			
Ice	17				17									7	10	
Laundry	98		8	90								2	21	13	12	50
Lumber	105		5	93	7					2	1	1	15	82	4	
Meat	44			11	31		2			1	6	6	17	10	3	1
Milk	49		3	33	13							1	6	7	34	1
Horseshoers	11		1	4	4		2						1	1	8	1
Stablemen and hostlers	143		2	31	38		72				2	35	70	18	15	3
Warehousemen	51		4	25	22						10	7	14	13	3	4
Yardmen (feed and fuel)	17			14	3								15	2		
Totals	1130		91	569	361	2	107			18	29	86	343	331	242	81
25. *Trunks, Harness, Etc.*																
Harness makers	6		1	5										3	3	
Trunk makers	3		3										3			
Totals	9		4	5									3	3	3	
26. *Upholsterers, Carpet Layers, Etc.*																
Carpet layers	20		14	6									2			18
Carpet sewers (F.)	7		1	6							1	3	3			
Mattress makers	12		10	2									2		10	
Shade makers	7			7								2		2	1	2
Tick sewers (F.)	14		11	3						3	7	3	1			
Upholsterers	7		3	4									1		1	5
Totals	67		39	28						3	8	8	9	2	12	25

*No employees considered.

TABLE V. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF OAKLAND during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
27. *Wood Workers.*																
Bench hands	157		154	3									1	7	67	82
Bench hands, apprentices	22		22							4	4	8	4	2		
Box makers	36		34	1	1							11	20	4	1	
Cabinet makers	44		34	8	2							5	3	5	18	13
Cabinet makers, apprentices	6		5	1						4	1	1				
Draughtsmen	7		7											1	2	4
Floor layers and finishers	20		20									1		3		16
Glaziers	30	12	18									1	1	1	19	8
Lumber hands	445		52	193						2	4	7	111	279	41	1
Mill hands	281	2	277	2						14	25	32	164	9	19	18
Millwrights	6		6											1	2	3
Pattern makers	14		12	2											3	11
Pattern makers, apprentices	9		9						1	3		2	2	1		
Planers	26		26										13	5	8	
Sanders	14		14										8	3	3	
Sash and door makers	25	16	9										10	5	8	2
Sash and door makers, apprentices	13	13								6	5	2				
Sawyers	34		30		4								8	7	18	1
Stickers	27		27											2	14	11
Tallymen	53		8	45							1		4	3	44	1
Varnishers and finishers	13		7	6									3	2	4	4
Wheelwrights	26		25	1										19	6	1
Wood turners	17		17												2	15
Totals	1325	43	813	462	7				1	33	40	70	352	359	279	191
28. *Miscellaneous.*																
Broom makers	4			4										4		
Casket coverers	5			5						1		2	1	1		
Chauffeurs	12		10	2										2	10	
Chemists	6		1	2	1	2										6
Engineers	66	1	21	35	8		1					1	5	6	29	25
Firemen	8		3	5										4	4	

Flour mill hands	7		5		2						1		2	1	1	2
Forewomen (F.)	19		2	5	9		3				2	13	2	1	1	
Garage help	20		1	19									14	6		
Glass bevelers	5		5												2	3
Jewelers and silversmiths	23		23											6	7	10
Jewelers and silversmiths, ap'tices	12		12						5	4	2	1				
Labelers (F.)	11			11						8	2	1				
Managers and foremen	705	2	325	288	71	2	17					4	17	24	45	615
Nurserymen	10			10								9		1		
Paper box makers	13			13								5	4	3		1
Paper box makers (F.)	78			78					14	62	2					
Paste factory hands	14		9		5								3	11		
Piano repairers and polishers	7		4	3									2	1	3	1
Piano tuners	9		5	4										4		5
Picture framers	8		8							1		1	2	3	1	
Pottery workmen	31			31									24	4	3	
Preserve and pickle factory hands	7		7									2	1	3	1	
Preserve and pickle packers (F.)	16		16							11	1		4			
Reed and rattan workers	12			12								4		4	4	
Roofers	4			4												4
Rubber factory hands	41			41						2	1	16	3	7	6	6
Soda and mineral water bottlers	5			5								1	2	2		
Stone and marble workers	5															
Tent and awning machine operators (F.)	6		4	1											4	1
Tent and awning workers	17			4	2						1	3	2			
Watchmakers	16		16		17					4		8	2			3
Watchmen	36		2	1	19		14		1	1	1	4	21	4		12
														6	2	
Totals	1238	3	479	583	134	4	35		20	94	13	75	111	108	123	694

TABLE VI. Hours of Labor and Wages Paid in the CITY OF OAKLAND during the Fiscal Year 1909-10.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	565	5	26	127	399	2	6			40	178	136	45	52	68	46
Breweries and bottling works	55		54		1								3	21	20	11
Butcher shop and slaughterhouse employees	109			17	88		4				1	1	3	60	36	8
Candy, confectionery, and sugar workers	81		3	78					4	20	28	5	6	7	8	3
Cannery employees	261				176		85	4	6	20	115	106	10			
Cigar and tobacco workers.*																
Clothing, shoes, etc.	780		198	580	2			20	29	81	172	111	50	88	97	132
Dairy employees	20		6	12	2								12	2	1	5
Electrical workers	70		69	1						2	1	1	8	2	4	52
Glass workers.*																
Laborers, general	858		57	644	154		3			1	115	321	340	80	1	
Laundry workers, dyers, etc.	619		8	601	10				1	161	160	122	79	81	9	6
Machine and repair shops, iron and steel mills	822		598	199	25			1	17	38	80	90	135	82	315	64
Metal workers	21		18	3						2	1	2	3	4	4	5
Plumbers, pipe fitters, etc.	42		40	2						1	2		14	6	7	12
Printing trades	200	1	197	2				1	3	12	20	18	9	6	23	108
Sheet metal workers	24		24							1	1		1	7		14
Ship builders, riggers, etc.*																
Soap and candle workers.*																
Store and office employees	3727	35	1859	1511	312	6	4	5	257	533	440	367	631	431	326	737
Structural iron workers	68		68							6	6	7	10	9	9	21
Tannery employees	30			30										30		
Textile workers.*																
Teamsters, hostlers, etc.	1130		91	569	361	2	107			18	29	86	343	331	242	81
Trunks, harness, etc.	9		4	5									3	3	3	
Upholsterers, carpet layers, etc.	67		39	28						3	8	8	9	2	12	25
Wood workers	1325	43	813	462	7				1	33	40	70	352	359	279	191
Miscellaneous	1238	3	479	583	134	4	35		20	94	13	75	111	108	123	694
Totals	12121	87	4651	5454	1671	14	244	31	338	1066	1410	1526	2177	1771	1587	2215

*No employees considered.

TABLE VII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SACRAMENTO during the Fiscal Year 1909-10.
(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
1. *Bakery and Restaurant Employees.*																
Bakers	23		3	20									4	5	5	9
Bakers, helpers	13		1	12							1	7	2	2	1	
Cooks	15			1	6	3	5						5	6	2	2
Cooks, helpers	10		1		5		4			1	3	5	1			
Kitchen help	13			1	6	4	2			2	11					
Waiters	19			1	8	4	6				5	10	3	1		
Waitresses (F.)	36		10	7	10	9				15	8	13				
Totals	129		15	42	35	20	17			18	28	35	15	14	8	11
2. *Breweries and Bottling Works.*																
Beer bottlers	45		44	1								2	17	25		1
Brewers	35		35												28	7
Brewery workmen	33		29		4						4	14	2	8	5	
Coopers	7		7													7
Maltsters	6		6												5	1
Totals	126		121	1	4						4	16	19	33	38	16
3. *Butcher Shop and Slaughterhouse Employees.*																
Meat cutters	19				19								3	6	9	1
Meat packers	9			2	7									7		2
Sausage makers	6				6								1	2	1	2
Slaughterhouse workmen	6				6								3	2		1
Totals	40			2	38								7	17	10	6

TABLE VII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SACRAMENTO during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
4. *Candy, Confectionery, and Sugar Workers.*																
Candy makers	12		1	7	4								4	5	1	2
Candy makers, helpers	17		2	12	3					4	7	5	1			
Confectionery packers (F.)	45			45					29	16						
Cream dippers (F.)	11		1	10					4	5	1	1				
Soda dispensers	3			3							1		1		1	
Totals	88		4	77	7				33	25	9	6	6	5	2	2
5. *Cannery Employees.*																
Canners (F.)	130					80	50			10	32	65	11	10	2	
Cannery workers	66				8	7	51					66				
Can sealers	22					10	12					10	12			
Cookroom workers	10					2	8					7	1	2		
Labelers (F.)	8					5	3				8					
Preparers (F.)	355					235	120		5	86	190	45	18	11		
Sorters	31					10	21				10	20	1			
Sorters (F.)	25					25					25					
Totals	647				8	374	265		5	96	265	213	43	23	2	
6 *Cigar and Tobacco Workers.*																
Cigar makers	30		30											15	14	1
Cigar makers, apprentices	5		5						1	1	1	2				
Tobacco strippers	11		11							7	4					
Totals	46		46						1	8	5	2		15	14	1
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	136		116	20					3	47	47	18	14	5	1	1
Bushelmen	5		5									1		2	1	1
Machine operators (F.)	5			5						1	3	1				
Milliners (F.)	43		43							6	13	8	5	4	1	6

Milliners, apprentices (F.)	26	26					10	15	1						
Tailors	26	13	12	1								6	1	18	1
Tailors, cutters	4	3		1											4
Tailors, finishers (F.)	11	8	3							6		5			
Totals	256	214	40	2			10	18	55	69	28	30	12	21	13
8. *Dairy Employees.*															
Butter makers	4			4									3		1
Creamery hands	5			5							3			1	1
Totals	9			9							3		3	1	2
9. *Electrical Workers.*															
Electricians	13	5	8										1	8	4
Electricians, apprentices	4	3	1											3	1
Electrical workers	2	2								1		1			
Totals	19	10	9							1		1	1	11	5
10. *Glass Workers.**															
11. *Laborers—General.*															
Laborers	51	5	27	19							38	9		4	
Totals	51	5	27	19							38	9		4	
12. *Laundry Workers, Dyers, Etc.*															
Ironers, hand	6		6								6				
Ironers, hand (F.)	10		10							10					
Manglers (F.)	16		16						16						
Markers and distributors	7		7						1	1		3	1	1	
Starchers	2		2							1		1			
Washroom hands	5		5								1	2	2		
Totals	46		46						17	12	7	6	3	1	
13. *Machine and Repair Shops, Iron and Steel Mills.*															
Blacksmiths	12	2	10									1	2	7	2
Blacksmiths, helpers	5	2	3							1	2	2			
Machinists	26	8	16	2									1	23	2
Machinists, apprentices	6	2	3	1					2	1	1	1	1		

*No employees considered.

TABLE VII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SACRAMENTO during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
13. *Machine and Repair Shops, Iron and Steel Mills*—Continued.																
Molders	16			16											16	
Molders, apprentices	3			3						1		1	1			
Riveters	8			8										8		
Totals	76		14	59	3					3	2	4	5	12	46	4
14. *Metal Workers.**																
15. *Plumbers, Pipe Fitters, Etc.*																
Plumbers	13		13													13
Plumbers, apprentices	11		10	1						11						
Plumbers, helpers	3			3							3					
Totals	27		23	4						11	3					13
16. *Printing Trades.*																
Bindery girls (F.)	16		16							13	3					
Bookbinders	7		7											2	5	
Compositors	32		32												17	15
Compositors, apprentices	11		11						3	2	4		2			
Engravers	6		6										1	1	2	2
Linotype operators	16		16												3	13
Press feeders	12		7		3	1	1		1	4		4	2		1	
Pressmen	11	1	10												7	4
Pressmen, apprentices	7	1	6						1	1		2	3			
Stereotypers	5	2	3										1	1	1	2
Totals	123	4	114		3	1	1		5	20	7	6	9	4	36	36
17. *Sheet Metal Workers.*																
Sheet metal workers	14		3	11										2	12	

Tinners	9		9												9	
Tinners, apprentices	2		2							2						
Totals	25		14	11						2				2	21	
18. *Ship Builders, Riggers, Etc.**																
19. *Soap and Candle Workers.**																
20. *Store and Office Employees.*																
Bookkeepers	75	1	21	34	17	1	1			1	1	2	6	9	11	45
Bookkeepers (F.)	65		42	13	9		1		1	8	18	11	10	8	6	3
Cash boys	4		4						4							
Cash girls (F.)	34		34						34							
Cashiers	10		7	2	1									1	3	6
Cashiers (F.)	48		26	13	5	4				23	12	3	4	5		1
Collectors	7		5	1	1						1		2	3		1
Drapers	8		6	2								1	2			5
Drug clerks	27			1	22	3	1							2	9	16
Elevator operators	6		4	2						1	4	1				
Errand boys	71	11	21	20	19			3	29	33	4	2				
Floor walkers	10		9	1								1		2	1	6
Office clerks	245		141	75	29				2	19	36	36	55	41	17	39
Office clerks (F.)	189		174	10	5			2	39	81	23	28	8	1	5	2
Porters and packers	136		39	43	50	4			3	7	14	37	51	17	6	1
Salesmen	445		203	155	84		3			7	20	31	73	72	64	178
Saleswomen (F.)	396		358	36	2				24	125	111	51	35	28	11	11
Shipping clerks	36		11	13	8		4				2	2	10	10	6	6
Solicitors	28		22	1	5							2	3	9	6	8
Stenographers (F.)	62		40	15	6	1				7	14	24	12	4		1
Stock clerks	70		27	40	3				14	17	3	2	16	13	2	3
Stock clerks (F.)	40		40						29	5	2	2	2			
Telephone operators (F.)	7		5	2						5	2					
Wrappers	6		6										1	4		1
Wrappers (F.)	76		76						35	38	3					
Totals	2101	12	1321	479	266	13	10	5	214	377	270	236	290	229	147	333
21. *Structural Iron Workers.**																
22. *Tannery Employees.**																
23. *Textile Workers.**																

*No employees considered.

TABLE VII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SACRAMENTO during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
24. *Teamsters, Hostlers, Etc.*																
Drivers—																
Bakery	8		1	7									8			
Bottle	21		12	2	7							1	1	5	13	1
Brewery (keg)	8		4		4											8
Draying	42			30	12							17	5	19	1	
General delivery	57		15	23	16		3			4	5	7	31	7	2	1
Grocery	14		1	2	11					3		2	7	2		
Lumber	15		1	14										14	1	
Meat	21			1	20					1	2	9	6	3		
Stablemen and hostlers	49		2	5	11		31				2	24	16	4	3	
Warehousemen	60				50	7	3				7	13	25	15		
Totals	295		36	84	131	7	37			8	16	73	99	69	20	10
25. *Trunks, Harness, Etc.*																
Harness and saddle makers	5			5							1		2	2		
Leather workers	41			41						4	4	5	11	13	4	
Totals	46			46						4	5	5	13	15	4	
26. *Upholsterers, Carpet Layers, Etc.*																
Carpet layers	11		3	8									3		6	2
Carpet sewers (F.)	4			4						1	1	2				
Drapery hangers	3			3										1	1	1
Mattress makers	5		5								1		1	2		1
Tick sewers (F.)	3		3								3					
Upholsterers	6		5	1										1	2	3
Totals	32		16	16						1	5	2	4	4	9	7
27. *Wood Workers.*																
Box makers	9			2	4		3					1	5	2	1	

Cabinet makers	27		22	5										10	15	2
Cabinet makers, apprentices	13		5	8					1	1	1	3	7			
Glaziers	13		12	1										1	12	
Lumber hands	20		2	18							2		15	3		
Nailers	7				2		5					5	2			
Pattern makers	5		1	4										1	4	
Varnishers and finishers	6		2	4									3		2	1
Totals	100		44	42	6		8		1	1	3	9	32	17	34	3
28. *Miscellaneous.*																
Broom makers	9			9							4			5		
Chauffeurs	4						4									4
Chemists	4			1	3								3			1
Engineers	15		8	1	3	1	2							4	5	6
Firemen	12		11				1						1	5	6	
Flour mill hands	15				15								9	3	2	1
Forewomen (F.)	34		15	1	2	13	3					13	4	7	2	8
Jewelers	2				2											2
Labelers (F.)	16		3	12	1				2	6	8					
Managers and foremen	218		86	64	47	5	16						5	6	7	200
Picture framers	3			3									1	1	1	
Rectifiers	6		1	2	3								1	2		3
Soda and mineral water bottlers	4			1	3								2	2		
Watch makers	5			2	3									1		4
Watchmen	10		2		2	1	5						6	2	2	
Totals	357		126	96	84	20	31		2	6	12	13	32	38	25	229

TABLE VIII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SACRAMENTO during the Fiscal Year 1909-10.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
Bakery and restaurant employees	129		15	42	35	20	17			18	28	35	15	14	8	11
Breweries and bottling works	126		121	1	4						4	16	19	33	38	16
Butcher shop and slaughterhouse employees	40			2	38								7	17	10	6
Candy, confectionery, and sugar workers	88		4	77	7				33	25	9	6	6	5	2	2
Cannery employees	647				8	374	265		5	96	265	213	43	23	2	
Cigar and tobacco workers	46		46						1	8	5	2		15	14	1
Clothing, shoes, etc.	256		214	40	2			10	18	55	69	28	30	12	21	13
Dairy employees	9				9							3		3	1	2
Electrical workers	19		10	9							1		1	1	11	5
Glass workers.*																
Laborers, general	51		5	27	19							38	9		4	
Laundry workers, dyers, etc.	46			46						17	12	7	6	3	1	
Machine and repair shops, iron and steel mills	76		14	59	3					3	2	4	5	12	46	4
Metal workers.*																
Plumbers, pipe fitters, etc.	27		23	4						11	3					13
Store and office employees	2101	12	1321	479	266	13	10	5	214	377	270	236	290	229	147	333
Structural iron workers.*																
Tannery employees.*																
Textile workers.*																
Teamsters, hostlers, etc.	295		36	84	131	7	37			8	16	73	99	69	20	10
Trunks, harness, etc.	46			46						4	5	5	13	15	4	
Upholsterers, carpet layers, etc.	32		16	16						1	5	2	4	4	9	7
Wood workers	100		44	42	6		8		1	1	3	9	32	17	34	3
Miscellaneous	357		126	96	84	20	31		2	6	12	13	32	38	25	229
Totals	4491	12	1995	1070	612	434	368	15	274	630	709	690	611	510	397	655

*No employees considered.

TABLE IX. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN JOSE during the Fiscal Year 1909-10.

(Tabulated by Industries and Occupations.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
1. *Bakery and Restaurant Employees.*																
Bakers	22		2	14	6						2	3	6	5	3	3
Bakers, apprentices	10			7	3				1	1	5	2	1			
Cooks	41		3		13		25				4	12	8	12		5
Cooks (F.)	10			6	4					4	4	2				
Cooks, helpers	14				8		6		1	8	2	3				
Kitchen help	36		4	3	12		17		2	27	7					
Kitchen help (F.)	9			3	5		1			7	2					
Waiters	43				27		16		3	8	29	1	2			
Waitresses (F.)	71		3	20	31		17		7	45	17		2			
Totals	256		12	53	109		82		14	100	72	23	19	17	3	8
2. *Breweries and Bottling Works.*																
Brewers	18		18												15	3
Brewery workmen	3		2		1								1		2	
Cellarmen	7		7											6	1	
Coopers	6		*6												4	2
Maltsters	10		10											3	6	1
Totals	44		43		1								1	9	28	6
3. *Butcher Shop and Slaughterhouse Employees.*																
Killers and dressers	3		2		1								2		1	
Meat cutters	24				19	3	2					1	2	14	4	3
Sausage makers	5				5								1	2	1	1
Totals	32		2		25	3	2					1	5	16	6	4

TABLE IX. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN JOSE during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
4. *Candy, Confectionery, and Sugar Workers.*																
Candy makers	7			2	2	3						2		3		2
Candy makers, helpers	7			1	3	3				2	5					
Cream dippers (F.)	2			2								2				
Totals	16			5	5	6				2	5	4		3		2
5. *Cannery Employees.*																
Canners (F.)	235				135		100			30	45	80	70	10		
Cannery workers	146				132		14				16	121	3	6		
Can sealers	20				20								15	3	2	
Cook room workers	28				28							19	6	3		
Labelers (F.)	30				10		20			20	7	2	1			
Preparers (F.)	544			4	170		370		45	117	122	215	25	20		
Sorters	40				20		20				20	20				
Totals	1043			4	515		524		45	167	210	457	120	42	2	
6. *Cigar and Tobacco Workers.*																
Cigar makers	17		17									9	1	7		
Tobacco strippers	3		3						1	1	1					
Totals	20		20						1	1	1	9	1	7		
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	66		3	63						14	49	3				
Bushelmen	13			13										6	5	2
Boot and shoe workers	4			4									3	1		
Garment fitters (F.)	6			6									2	1		3
Glove cutters	6		1	5							1		5			
Glove makers (F.)	12		4	8						8	4					
Milliners (F.)	16			16						7	4		1	3		1

Milliners, apprentices (F.)	8			8				2	2	4						
Seamstresses (F.)	7		2	2	3					1	5	1				
Tailors	7			7										3	3	1
Totals	145		10	132	3			2	2	34	63	4	11	14	8	7
8. *Dairy Employees.*																
9. *Electrical Workers.*																
Electricians	13		12	1									2		10	1
Electricians, apprentices	5		4	1						1		4				
Electrical workers	4			4										2	2	
Totals	22		16	6						1		4	2	2	12	1
10. *Glass Workers.**																
11. *Laborers—General.*																
Laborers	43		8	23	12					2		9	14	11	7	
Totals	43		8	23	12					2		9	14	11	7	
12. *Laundry Workers, Dyers, Etc.*																
Dyers and cleaners	12			4	8						1	3	4	2		2
Ironers, hand	11		8	1	2					3	6	2				
Ironers, hand (F.)	43			32	3		8		3	5	28	7				
Ironers, machine	3		1	1			1			1	1		1			
Ironers, machine (F.)	16		5	11						7	8	1				
Manglers	2			2						1	1					
Manglers (F.)	33		13	20						24	8	1				
Markers and distributors	13		4	9							1		6	6		
Pressers	6			1	5								3	3		
Pressers (F.)	9			3	6						2	7				
Shirt finishers	2		1	1								1	1			
Shirt finishers (F.)	2			2							2					
Shirt folders (F.)	4		1	3						1	2	1				
Starchers	7		2	5							1	5	1			
Washroom hands	13		3	9	1					1		5	2	5		
Totals	176		38	104	25		9		3	43	61	33	18	16		2

*No employees considered.

TABLE IX. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN JOSE during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	16		10	6									4	8	3	1
Blacksmiths, apprentices	6		3	3					2	1	2		1			
Blacksmiths, helpers	9		4	5						1	1	4	2	1		
Casting chippers	2		2									2				
Core makers	2		2								1	1				
Cupolamen	3		3										2			1
Foundry helpers	4		4							1		3				
Machine hands	14		14										2	8	4	
Machinists	72		55	16	1							1	5	36	29	1
Machinists, apprentices	20		15	5						4	11	2	3			
Machinists, helpers	8		5	2	1						2	3	3			
Molders	11		11										1	4	3	3
Molders, helpers	4		4						1			3				
Totals	171		132	37	2				3	7	17	19	23	57	39	6
14. *Metal Workers.**																
15. *Plumbers, Pipe Fitters, Etc.*																
Plumbers	23		23													23
Plumbers, helpers	11		11						1		10					
Totals	34		34						1		10					23
16. *Printing Trades.*																
Bindery girls (F.)	5		5							3	2					
Bookbinders	3		3												3	
Compositors	20	4	8	8							1	1			9	9
Compositors (F.)	4	1	3										2		1	1
Compositors, apprentices	10	3	4	3					2	3	2	2	1			
Linotype operators	19	7	1	11											2	17
Linotype operators, apprentices	2	1		1							1	1				

Lithographers	5			5												5
Press feeders	6		6							5	1					
Pressmen	12	1	5	6											8	4
Pressmen, apprentices	2	1	1								1	1				
Proofreaders	4	2	1	1							1	2				1
Proofreaders (F.)	2			2							1		1			
Totals	94	20	37	37					2	11	10	7	4		23	37
17. *Sheet Metal Workers.*																
Sheet metal workers	12		12											11	1	
Tinners	19		17	2									1	2	8	8
Tinners, apprentices	10		10						1	1	7	1				
Totals	41		39	2					1	1	7	1	1	13	9	8
18. *Ship Builders, Riggers, Etc.**																
19. *Soap and Candle Workers.**																
20. *Store and Office Employees.*																
Bookkeepers	83		23	33	20	2	5			3	3	9	4	22	10	32
Bookkeepers (F.)	80	1	17	53	8		1		1	13	25	16	19	3		3
Cashiers	10		1	5	1		3							2	1	7
Cashiers (F.)	22		4	12	6					5	12	2	1	2		
Collectors	27		5	19	2		1				2	2	7	4	4	8
Drapers	6		2	4						1	1	1	1			2
Elevator operators	2			1	1					1	1					
Errand boys	45	4	7	31	2		1	1	24	16	3	1				
Office clerks	39		5	23	2	2	7			2	4	7	7	13	1	5
Office clerks (F.)	11		6	4	1					8	1			1		1
Porters and packers	81		19	40	17	1	4			8	5	45	17	6		
Salesmen	273		38	147	83	4	1		1	15	19	34	47	67	27	63
Saleswomen (F.)	205		51	141	1	3	9		12	90	70	23	8	2		
Shipping clerks	18		8	7	3				1	4	1	1	7	2	2	
Solicitors	4		1	3										2		2
Stenographers (F.)	31		8	18	5					2	13	6	9	1		
Stock clerks	14		5	5	4					5		3	3	3		
Wrappers	7			2	5					1	3	3				
Wrappers (F.)	4			4					3	1						
Totals	962	5	200	552	161	12	32	1	42	175	163	153	130	130	45	123

*No employees considered.

TABLE IX. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN JOSE during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
21. *Structural Iron Workers.**																
22. *Tannery Employees.**																
23. *Textile Workers.**																
24. *Teamsters, Hostlers, Etc.*																
Drivers—																
Bakery	12			6	6				3	2	2	1	3	1		
Bottle	5		3	2									2	3		
Brewery (keg)	5		3		2										1	4
Draying	42		7		35							7		28	2	5
General delivery	49		11	19	16	3				3	4	5	9	20	1	7
Grocery	25			7	16		2			3	5	17				
Ice	12			12									12			
Laundry	41		11	27	3						2	1	14	3	7	14
Lumber	22		4	18										22		
Meat	14			3	8	2	1			1	5	5	3			
Horseshoers	3				3										3	
Stablemen and hostlers	39			3	7	1	28					23	10	3	3	
Warehousemen	10		4		5		1					1	7	1		1
Totals	279		43	97	101	6	32		3	9	18	60	60	81	17	31
25. *Trunks, Harness, Etc.**																
26. *Upholsterers, Carpet Layers, Etc.*																
Carpet layers	8		5	3								1	2	1	1	
Carpet sewers (F.)	3		2	1							2	1				
Upholsterers	3		2	1										1	2	
Totals	14		9	5							2	2	2	2	6	

27. *Wood Workers.*																
Bench hands	23		7	16												23
Bench hands, apprentices	6			6								3		3		
Box makers	24			16	8							14	8			2
Cabinet makers	4		1	3											4	
Coopers	4			4										4		
Draughtsmen	6		2	4										1		5
Lumber hands	38		4	34								1		37		
Mill hands	32		7	25						2			5		12	13
Nailers	14				14					1		13				
Pattern makers	4		4									1		1	1	1
Planers	7		5	2										3		4
Sanders	5		2	3											2	3
Sash and door makers	18		9	9										7	5	6
Sawyers	10		2	8										1		9
Stickers	8		4	4										1		7
Tallymen	7			7										7		
Varnishers and finishers	2		2												2	
Wheelwrights	3		1	1	1									3		
Wood turners	3		2	1												3
Totals	218		52	143	23					3		32	13	68	26	76
28. *Miscellaneous.*																
Engineers	25		12	7	6								3	9	4	9
Chauffeurs	2		2										1	1		
Forewomen (F.)	15			5	8	1	1			5		3	3	1	2	1
Garage help	8		7		1				1	1		2	3	1		
Managers and foremen	183		48	89	37		9					1	6	9	15	152
Paste factory hands	10				10								10			
Pottery workmen	23			23						1	3	11	3		5	
Soda and mineral water bottlers	7		5	2								2		5		
Stone and marble workers	2		2												1	1
Watchmen	16			1	2		13			2		9	3	2		
Totals	291		76	127	64	1	23		1	1	11	28	32	28	27	163

*No employees considered.

TABLE X. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN JOSE during the Fiscal Year 1909-10.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	256		12	53	109		82		14	100	72	23	19	17	3	8
Breweries and bottling works	44		43		1								1	9	28	6
Butcher shop and slaughterhouse employees	32		2		25	3	2					1	5	16	6	4
Candy, confectionery, and sugar workers	16			5	5	6				2	5	4		3		2
Cannery employees	1043			4	515		524		45	167	210	457	120	42	2	
Cigar and tobacco workers	20		20						1	1	1	9	1	7		
Clothing, shoes, etc.	145		10	132	3			2	2	34	63	4	11	14	8	7
Dairy employees.*																
Electrical workers	22		16	6						1		4	2	2	12	1
Glass workers.*																
Laborers, general	43		8	23	12					2		9	14	11	7	
Laundry workers, dyers, etc.	176		38	104	25		9		3	43	61	33	18	16		2
Machine and repair shops, iron and steel mills	171		132	37	2				3	7	17	19	23	57	39	6
Metal workers.*																
Plumbers, pipe fitters, etc.	34		34						1		10					23
Printing trades	94	20	37	37					2	11	10	7	4		23	37
Sheet metal workers	41		39	2					1	1	7	1	1	13	9	8
Ship builders, riggers, etc.*																
Soap and candle workers.*																
Store and office employees	962	5	200	552	161	12	32	1	42	175	163	153	130	130	45	123
Structural iron workers.*																
Tannery employees.*																
Textile workers.*																
Teamsters, hostlers, etc.	279		43	97	101	6	32		3	9	18	60	60	81	17	31
Trunks, harness, etc.*																
Upholsterers, carpet layers, etc.	14		9	5							2	2	2	2	6	
Wood workers	218		52	143	23					3		32	13	68	26	76
Miscellaneous	291		76	127	64	1	23		1	1	11	28	32	28	27	163
Totals	3901	25	771	1327	1046	28	704	3	118	557	650	846	456	516	258	497

*No employees considered.

TABLE XI. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF STOCKTON during the Fiscal Year 1909-10.
(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
1. *Bakery and Restaurant Employees.*																
Bakers	6				4		2							3	3	
Bakers, helpers	2				2								2			
Cooks	12				1		11			1	1	10				
Cooks, helpers	11				1		10			5	6					
Kitchen help	7						7			6	1					
Waiters	26				10	4	12				23		3			
Totals	64				18	4	42			12	31	10	5	3	3	
2. *Breweries and Bottling Works.**																
3. *Butcher Shop and Slaughterhouse Employees.*																
Killers and dressers	10	1		3	3		3					1	1	7	1	
Killers and dressers, apprentices	2				2						1	1				
Meat cutters	15			4	7	2	2						1	10	3	1
Sausage makers	2				2							1		1		
Vaqueros	5				4	1				1	4					
Totals	34	1		7	18	3	5			1	5	3	2	18	4	1
4. *Candy, Confectionery, and Sugar Workers.**																
5. *Cannery Employees.**																
6. *Cigar and Tobacco Workers.**																

*No employees considered.

TABLE XI. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF STOCKTON during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	17		2	15						1	3	11	2			
Hat makers (F.)	5		5						3	2						
Milliners (F.)	3		1	2										3		
Tailors	31		18	13										15	15	1
Tailors, cutters	2		1	1											1	1
Tailors, finishers (F.)	3		1	2										3		
Totals	61		28	33					3	3	3	11	2	21	16	2
8. *Dairy Employees.**																
9. *Electrical Workers.**																
10. *Glass Workers.**																
11. *Laborers—General.*																
Laborers	26		1	25							3	22	1			
Totals	26		1	25							3	22	1			
12. *Laundry Workers, Dyers, Etc.*																
Ironers, hand (F.)	35			35						5	16	14				
Ironers, machine (F.)	31			31							14	17				
Manglers (F.)	34			34						26	8					
Markers and distributors	4			4									2	2		
Markers and distributors (F.)	5			5							2	3				
Washroom hands	11			11							1	1	5	3	1	
Totals	120			120						31	41	35	7	5	1	

13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	19		1	18										1	18	
Blacksmiths, helpers	25		1	24							1	7	11	6		
Boiler makers	5			5										3	1	1
Boiler makers, helpers	4			4								3		1		
Casting chippers	8		6	2								1	1	6		
Core makers	5		5												5	
Cupolamen	2		1	1										1	1	
Draughtsmen	4		2	2									1	1	1	1
Draughtsmen, apprentices	4		2	2						1	2			1		
Foundry helpers	33		1	32						1	3	3	24	2		
Machine hands	46		38	8								6	15	17	8	
Machinists	67		32	30	5							1	16	36	13	1
Machinists, apprentices	44		36	8					19	10	13	2				
Machinists, helpers	23		10	13							1	17	5			
Molders	23		14	9										3	18	2
Molders, apprentices	7		4	3						3	3		1			
Molders, helpers	9		9									9				
Totals	328		162	161	5				19	15	23	49	74	78	65	5
14. *Metal Workers.**																
15. *Plumbers, Pipe Fitters, Etc.*																
Plumbers	14		14												7	7
Plumbers, helpers	4		4								3	1				
Totals	18		18								3	1			7	7
16. *Printing Trades.*																
Compositors	11		11												11	
Linotype operators	3		3												3	
Pressmen	4		4												4	
Totals	18		18												18	
17. *Sheet Metal Workers.**																
18. *Ship Builders, Riggers, Etc.**																

*No employees considered.

TABLE XI. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF STOCKTON during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
19. *Soap and Candle Workers.*																
Soap makers	2			2									1		1	
Soap workers	7			7								4	3			
Totals	9			9								4	4		1	
20. *Store and Office Employees.*																
Bookkeepers	44		9	27	7	1						2	6	10	4	22
Bookkeepers (F.)	41	3	17	19	2					3	5	4	11	12	2	4
Cashiers	7		5	2												7
Cashiers (F.)	27		3	18	6					2	4	13	7			1
Drapers	2		1	1										1		1
Drug clerks	21			2	19								1	1	3	16
Errand boys	47	4	17	22	4			1	19	17	10					
Floor walkers	4			4												4
Office clerks	32		16	15	1						1	2	7	5	5	12
Office clerks (F.)	2		1	1						1		1				
Porters and packers	50	3	1	34	10	1	1		3		5	20	17	3		2
Salesmen	178	4	23	124	26		1				10	6	29	57	38	38
Saleswomen (F.)	78		22	54	2				1	10	24	34	9			
Shipping clerks	8			3	5								6	1		1
Stenographers (F.)	31	1	19	10	1						6	10	15			
Stock clerks	11		1	10						1		2	2	4		2
Telephone operators (F.)	3		1	2						3						
Wrappers (F.)	8			8						1	2	5				
Totals	594	15	136	356	83	2	2	1	23	38	67	99	110	94	52	110
21. *Structural Iron Workers.*																
Architectural iron workers	5				5							2	3			
Structural iron workers	4			4										4		
Structural iron workers, helpers	2			2							2					
Totals	11			6	5						2	2	3	4		

22. *Tannery Employees.**															
23. *Textile Workers.**															
24. *Teamsters, Hostlers, Etc.*															
Drivers—															
Bakery	6				2	4					2	4			
Brewery (keg)	3			3									3		
Draying	38		3	14	21						1	14	22		1
General delivery	28	1		21	6				1		4	16	7		
Laundry	6			6									6		
Lumber	3		2	1						1	1	1			
Meat	15			3	8	1	3			6	3	4	2		
Stablemen and hostlers	20			3	4	13			1		14	4	1		
Warehousemen	22		11	1	10							12	8	2	
Totals	141	1	16	52	51	18	3		2	7	25	55	49	2	1
25. *Trunks, Harness, Etc.*															
Harness and saddle makers	7			7								2	2	3	
Totals	7			7								2	2	3	
26. *Upholsterers, Carpet Layers, Etc.**															
27. *Wood Workers.*															
Bench hands	13		13											9	4
Ladder makers	5			5									5		
Lumber hands	20		5	15						3		5	12		
Mill hands	18		8	10						2	4			12	
Millwrights	18			13	5							6	10	1	1
Pattern makers	6		4	2										1	5
Pattern makers, apprentices	3		2	1				1	2						
Varnishers and finishers	3			3								1	2		
Totals	86		32	49	5			1	2	5	4	12	29	23	10
28. *Miscellaneous.*															
Bag machine operators	9			6	3					3	3				2
Bag machine operators (F.)	29			26	3			7	18	3	1				
Bag workers	12			11	1			6	1	3	1	1			
Bag workers (F.)	28			17	11			15	6	7					

*No employees considered.

TABLE XI. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF STOCKTON during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
28. *Miscellaneous*—Continued.																
Cereal packers (F.)	7				7					7						
Engineers	15		1	7	3		4						3	4	5	3
Firemen	22				12		10					4	4	14		
Flour millers	14				14										9	5
Flour mill hands	94				94					1	2	9	34	46	2	
Jewelers	4		1	5							1	1	3		1	
Forewomen (F.)	6		4													4
Managers and foremen	106		34	52	18	2								5	9	92
Photographic workers	3			3							1	1				1
Tent and awning workers	6			6						1	2		1	2		
Watchmen	8			3			5					5	3			
Totals	363		40	136	166	2	19		28	34	22	25	50	71	26	107

TABLE XII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF STOCKTON during the Fiscal Year 1909-10.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	64				18	4	42			12	31	10	5	3	3	
Breweries and bottling works.*																
Butcher shop and slaughterhouse employees	34	1		7	18	3	5			1	5	3	2	18	4	1
Candy, confectionery, and sugar workers*																
Cannery employees.*																
Cigar and tobacco workers.*																
Clothing, shoes, etc.	61		28	33					3	3	3	11	2	21	16	2
Dairy employees.*																
Electrical workers.*																
Glass workers.*																
Laborers, general	26		1	25							3	22	1			
Laundry workers, dyers, etc.	120			120						31	41	35	7	5	1	
Machine and repair shops, iron and steel mills	328		162	161	5				19	15	23	49	74	78	65	5
Metal workers.*																
Plumbers, pipe fitters, etc.	18		18								3	1			7	7
Printing trades	18		18												18	
Sheet and metal workers.*																
Ship builders, riggers, etc.*																
Soap and candle workers	9			9								4	4		1	
Store and office employees	594	15	136	356	83	2	2	1	23	38	67	99	110	94	52	110
Structural iron workers	11			6	5						2	2	3	4		
Tannery Employees.*																
Textile workers.*																
Teamsters, hostlers, etc.	141	1	16	52	51	18	3			2	7	25	55	49	2	1
Trunks, harness, etc.	7			7									2	2	3	
Upholsterers, carpet layers, etc.*																
Wood workers	86		32	49	5				1	2	5	4	12	29	23	10
Miscellaneous	363		40	136	166	2	19		28	34	22	25	50	71	26	107
Totals	1880	17	451	961	351	29	71	1	74	138	212	290	327	374	221	243

*No employees considered.

TABLE XIII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN DIEGO during the Fiscal Year 1909-10.
(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
1. *Bakery and Restaurant Employees.*																
Bakers	26			4	22								3	9	8	6
Bakers, helpers	3				3						2	1				
Cooks	17				9	7	1					1	2	5	7	2
Cooks (F.)	5			1	4						2	1	1		1	
Cooks, helpers	6	1			4		1			1	4	1				
Kitchen help	22				13	8	1			3	19					
Waiters	30	1		3	14	10	2	1		3	23	3				
Waitresses (F.)	19	2		4	7	4	2		1	6	11	1				
Totals	128	4		12	76	29	7	1	1	13	61	8	6	14	16	8
2. *Breweries and Bottling Works.**																
3. *Butcher Shop and Slaughterhouse Employees.*																
Coolermen	2					2							2			
Meat cutters	39		4			35						4	24	10	1	
Sausage makers	5					5						1	2	2		
Totals	46		4			42						5	28	12	1	
4. *Candy, Confectionery, and Sugar Workers.*																
Candy makers	3			3									1	1		1
Candy makers, helpers	2			2						2						
Cream dippers (F.)	4			4					1	1		2				
Ice cream makers	3			3							1			2		
Soda dispensers	3			2	1					1		1	1			
Totals	15			14	1				1	4	1	3	2	3		1

5. *Cannery Employees.*																
Canners (F.)	12			12						12				1		
Cannery workers	13			12	1					12				1		
Labelers (F.)	2			2						2						
Totals	27			26	1					26				1		
6. *Cigar and Tobacco Workers.*																
Cigar makers	55		55									3	11	20	13	8
Tobacco strippers	7		7							1	3	3				
Tobacco strippers (F.)	10		10						4	4	1	1				
Totals	72		72						4	5	4	7	11	20	13	8
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	36		34	2						9	17	9	1			
Bushelmen	3		1	1	1									2		1
Milliners (F.)	4		4								3	1				
Seamstresses (F.)	6	1	4	1					1	1	4					
Tailors	6		6										1	4		1
Totals	55	1	49	4	1				1	10	24	10	2	6		2
8. *Dairy Employees.**																
9. *Electrical Workers.*																
Electricians	9		9										6	2	1	
Electricians, apprentices	7		7						1	4	2					
Electrical workers	6		6									1		5		
Totals	22		22						1	4	2	1	6	7	1	
10. *Glass Workers.**																
11. *Laborers, General.*																
Laborers	69	4	20	33	8		4			4	5	35	18	5	2	
Totals	69	4	20	33	8		4			4	5	35	18	5	2	
12. *Laundry Workers, Dyers, Etc.*																
Dyers and cleaners	3				3								1	1		1
Ironers, hand (F.)	25				25					3	17	5				
Ironers, machine (F.)	17				17					6	8	3				

*No employees considered.

TABLE XIII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN DIEGO during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
12. *Laundry Workers, Dyers, Etc.*—																
Manglers (F.)	28				28				1	20	7					
Markers and distributors	10				10						1	2	4	3		
Markers and distributors (F.)	6				6						3	1	1	1		
Pressers	3			1	2						1	1	1			
Pressers (F.)	6			2	4						2	4				
Starchers	2				2							1	1			
Starchers (F.)	4				4					1	3					
Washroom hands	7				7					1		2	3	1		
Totals	111			3	108				1	31	42	19	11	6		1
13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	5			2	3								2	2	1	
Blacksmiths, helpers	2			2									2			
Boiler makers	13			13										10	3	
Boiler makers, helpers	3			3									3			
Casting chippers	6			6								6				
Core makers	4			4								2		2		
Cupolamen	3			3								2	1			
Foundry helpers	14		7	7							1	8	5			
Machinists	23		9	7	6	1							5	10	5	3
Machinists, helpers	11			8	3					1	3	2	4	1		
Molders	8			8											7	1
Molders, apprentices	2			2						1			1			
Stove mounters	5		5											1	1	3
Totals	99		21	65	12	1				2	4	20	23	26	17	7
14. *Metal Workers.**																

15. *Plumbers, Pipe Fitters, Etc.*																
Plumbers	11		4	7										1	1	9
Plumbers, helpers	3		1	2					1		1	1				
Totals	14		5	9					1		1	1		1	1	9
16. *Printing Trades.**																
17. *Sheet Metal Workers.*																
Sheet metal workers	17		17										1	2	1	13
Sheet metal workers, apprentices	7		7						1	1	1	1	1		2	
Sheet metal workers, helpers	9		9							2		2	5			
Tinners	6		6												3	3
Totals	39		39						1	3	1	3	7	2	6	16
18. *Ship Builders, Riggers, Etc.**																
19. *Soap and Candle Workers.*																
Soap makers	2			2										2		
Soap makers, helpers	4			4								4				
Soap wrappers (F.)	6			6						6						
Totals	12			12						6		4		2		
20. *Store and Office Employees.*																
Bookkeepers	34		6	11	10	7					3		8	5	9	9
Bookkeepers (F.)	27		8	10	8	1			1	5	3	9	5	3		1
Cash boys	28		26	2					2	21	4	1				
Cashiers	7		1	2	3		1			1	1	3			1	1
Cashiers (F.)	12		1	7	4				1	7	1	1	1		1	
Collectors	3			3								1	1	1		
Drug clerks	8		2	1	5										4	4
Errand boys	14		5	3	6			1	6	6	1					
Office clerks	57	1	3	33	18	2				5	1	14	16	6	8	7
Office clerks (F.)	16		9	4	3				1	3	2	2	6	1		1
Porters and packers	20	1		10	9				2	1	2	9	4	2		
Salesmen	194		45	65	77	7			1	6	9	23	41	41	27	46
Saleswomen (F.)	139		60	69	10				36	13	22	22	10	5	1	
Shipping clerks	14			1	10	3					1	5	2	4	1	1
Solicitors	4				4								3		1	
Stenographers (F.)	13		6	7						1	5	4	2	1		
Stock clerks	16		1	5	10				1	3	1	4	2	5		

* No employees considered.

TABLE XIII. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN DIEGO during the Fiscal Year 1909-10—Cont.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
20. *Store and Office Employees*—Continued.																
Telephone operators (F.)	5			3	2						2	3				
Wrappers	7		2	1		4				3		2	2			
Totals	618	2	175	237	179	24	1	1	51	105	58	103	103	71	53	70
21. *Structural Iron Workers.**																
22. *Tannery Workers.**																
23. *Textile Workers.**																
24. *Teamsters.*																
Drivers—																
Bakery	10				10								3	7		
Bottle	4			2	2								1	3		
Draying	16			16								5	11			
General delivery	43		3	25	10	5			1	4	6	16	14	2		
Grocery	23				23				1			8	12	2		
Laundry	24			1	23					1	1	5	10	7		
Lumber	6		2		4							1	1	4		
Meat	15				3	12					1	11	1	2		
Milk	4				4								4			
Stablemen and hostlers	8			1	3	4					1	2	4	1		
Warehousemen	10				10							6	3	1		
Yardmen (feed and fuel)	2			2							2					
Totals	165		5	47	92	21			2	5	11	54	64	29		
25. *Trunks, Harness, Etc.**																
26. *Upholsterers, Carpet Layers, Etc.**																

27. *Wood Workers.*																
Bench hands	6		6										2	4		
Lumber hands	34		1		33						15	18	1			
Mill hands	31		6	1	24				1		11	14	4	1		
Pattern makers	4			4										3	1	
Planers	11		1		10						2	9				
Sash and door makers	9		9							3	2	1	3			
Sawyers	2		1		1								1	1		
Stickers	3		2		1							1		2		
Varnishers and finishers	10			4	6							7	1			2
Totals	110		26	9	75				1	3	30	50	12	11	3	
28. *Miscellaneous.*																
Chauffeurs	2		1		1						1		1			
Engineers	11		1	1	9						1	1	8			1
Forewomen (F.)	2			1	1					2						
Jewelers	3			3												3
Managers and foremen	71		19	19	25	7	1						11	15		45
Piano tuners	2			2								1				1
Soda and mineral water bottlers	3			3							1		2			
Stone and marble workers	28			28									3	25		
Watch makers	4		1	3								1				3
Totals	126		22	60	36	7	1			2	3	3	25	40		53

*No employees considered.

TABLE XIV. Hours of Labor and Wages Paid in Stores and Factories in the CITY OF SAN DIEGO during the Fiscal Year 1909-10.
(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	128	4		12	76	29	7	1	1	13	61	8	6	14	16	8
Breweries and bottling works.*																
Butcher shops and slaughterhouse employees	46		4			42						5	28	12	1	
Candy, confectionery, and sugar workers	15			14	1				1	4	1	3	2	3		1
Cannery employees	27			26	1					26				1		
Cigar and tobacco workers	72		72						4	5	4	7	11	20	13	8
Clothing, shoes, etc.	55	1	49	4	1				1	10	24	10	2	6		2
Dairy employees.*																
Electrical workers	22		22						1	4	2	1	6	7	1	
Glass workers.*																
Laborers, general	69	4	20	33	8		4			4	5	35	18	5	2	
Laundry workers, dyers, etc.	111			3	108				1	31	42	19	11	6		1
Machine and repair shops, iron and steel mills	99		21	65	12	1				2	4	20	23	26	17	7
Metal workers.*																
Plumbers, pipe fitters, etc.	14		5	9					1		1	1		1	1	9
Printing trades.*																
Sheet metal workers	39		39						1	3	1	3	7	2	6	16
Ship builders, riggers, etc.*																
Soap and candle workers	12			12						6		4		2		
Store and office employees	618	2	175	237	179	24	1	1	51	105	58	103	103	74	53	70
Structural iron workers.*																
Tannery workers.*																
Textile workers.*																
Teamsters, hostlers, etc.	165		5	47	92	21			2	5	11	54	64	29		
Trunks, harness, etc.*																
Upholsterers, carpet layers, etc.*																
Wood workers	110		26	9	75					1	3	30	50	12	11	3
Miscellaneous	126		22	60	36	7	1				2	3	3	25	40	53
Totals	1728	11	460	531	589	124	13	2	64	219	219	306	334	245	161	178

TABLE XV. Hours of Labor and Wages Paid in Stores and Factories in MISCELLANEOUS TOWNS OF THE STATE during the Fiscal Year 1909-10.

(Tabulated by Industries and Occupations.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
1. *Bakery and Restaurant Employees.*																
Bakers	122	------	13	58	46	2	3	------	------	------	4	5	9	24	57	23
Bakers, apprentices	22	------	2	16	3	------	1	------	1	3	3	8	6	1	------	------
Bakers, helpers	36	------	1	6	28	1	------	------	------	5	2	8	4	1	15	1
Cooks	87	------	20	7	47	3	10	------	------	5	11	19	23	18	7	4
Cooks, helpers	12	------	------	------	11	------	1	------	------	3	7	2	------	------	------	------
Kitchen help	54	------	10	2	35	------	7	------	2	25	26	1	------	------	------	------
Waiters	65	5	2	1	50	------	7	3	2	5	28	21	5	------	1	------
Waitresses (F.)	76	------	35	3	34	4	------	------	4	48	19	5	------	------	------	------
Totals	474	5	83	93	254	10	29	3	9	94	100	69	47	44	80	28
2. *Breweries and Bottling Works.*																
Beer bottlers	78	------	32	27	17	2	------	------	------	15	1	10	19	28	5	------
Brewers	31	------	20	11	------	------	------	------	------	------	------	1	1	4	17	8
Maltsters	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------	1
Totals	110	------	53	38	17	2	------	------	------	15	1	11	20	32	22	9
3. *Butcher Shop and Slaughterhouse Employees.*																
Coolermen	7	------	------	3	4	------	------	------	------	------	------	------	4	2	------	1
Killers and dressers	64	2	6	30	24	2	------	------	------	------	1	1	10	31	15	6
Killers and dressers, apprentices	4	------	------	4	------	------	------	------	------	------	------	2	2	------	------	------
Meat cutters	132	------	------	25	86	12	9	------	------	1	------	3	20	63	41	4
Packers	1	------	------	------	1	------	------	------	------	------	------	------	1	------	------	------
Sausage makers	13	------	------	1	9	2	1	------	------	------	------	2	1	8	2	------
Slaughterhouse workmen	27	------	------	6	21	------	------	------	------	2	------	19	4	2	------	------
Vaqueros	10	------	------	4	5	1	------	------	------	------	------	2	3	5	------	------
Totals	258	2	6	73	150	17	10	------	------	3	1	29	45	111	58	11

TABLE XV. Hours of Labor and Wages Paid in Stores and Factories in MISCELLANEOUS TOWNS OF THE STATE during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
4. *Candy, Confectionery, Etc.*																
Candy makers	10			5	4	1				1		2		2	4	1
Candy makers, helpers	15		1	12	2				1	4	9	1				
Cracker bakers	1			1											1	
Ice cream makers	7			2	5					1	1	1		2	1	1
Candy and cracker packers (F.)	50		10	37	3				13	30	5	1	1			
Totals	83		11	57	14	1			14	36	15	5	1	4	6	2
5. *Cannery Employees.* See table on Cannery Employees.																
6. *Cigar and Tobacco Workers.**																
7. *Clothing, Shoes, Etc.*																
Alteration hands (F.)	33		8	23	2				1		9	17	2		4	
Boot and shoe workers	113			113					9	12	20	16	29	22	5	
Boot and shoe workers (F.)	9			9					3	1		5				
Bushelmen	14		9	3	2					2	1	1	6	3	1	
Garment cutters	7		7												7	
Garment fitters	3			3							2		1			
Glove cutters	46		10	36					2	1	5		1	27	10	
Glove finishers	60		25	35						5		50				5
Glove makers (F.)	84		40	44					3	1	80					
Hat makers (F.)	36			36						10	6	10	10			
Machine operators	155		79	66	10				5	20	88	11	11	8	4	8
Machine operators (F.)	202		74	84	44				15	71	39	55	22			
Milliners (F.)	33		1	32				1	4	10	3	2	4	2	3	4
Milliners, apprentices (F.)	16			16				10	6							
Seamstresses (F.)	32		2	22	8				6	1	14	8	3			
Tailors	44			42	2					1		2	8	5	20	8
Tailors, cutters	1			1												1
Tailors, finishers	7			7							3	2	1	1		

8. *Dairy Employees.*																
Butter makers	25		14	3	8						1	15	5	2	2	
Can washers	27			17	10					3	21	3				
Milkers	99			28	71					12	87					
Totals	151		14	48	89					15	109	18	5	2	2	
9. *Electrical Workers.*																
Electricians	39		33	4	1		1		2	1	2	7	1	17	9	
Electricians, apprentices	5		4				1	1	2	1	1					
Electrical workers	32		23	7			2		1			1	11	18	1	
Electrical workers, helpers	1		1						1							
Totals	77		61	11	1		4	1	6	2	3	8	12	35	10	
10. *Glass Workers.**																
11. *Laborers—General.*	3783		435	1284	1997	29	38	8	1	115	320	1414	547	1354	24	
Totals	3783		435	1284	1997	29	38	8	1	115	320	1414	547	1354	24	
12. *Laundry Workers.*																
Dyers and cleaners	37			11	23	3					7	21	9			
Ironers, hand (F.)	254			7	13					13	7					
Dyers and cleaners (F.)	20			10	43	31	20		1	8	66	23	3	3		
Ironers, hand	104		2	111	89	29	23			97	122	29	6			
Manglers	64			26	38				2	18	30	2	9	3		
Manglers (F.)	192		13	111	66	2			13	111	55	12	1			
Markers and distributors	73		3	39	30	1				7	7	12	23	18	5	1
Markers and distributors (F.)	28			12	16					9	4	10	3	2		
Pressers	30			22	8						1	4	11	7	5	2
Pressers (F.)	36			26	10					2	12	20	2			
Shirt finishers	6				6						1	1	2	2		
Shirt finishers (F.)	2				2						2					
Starchers	25			12	13				1	2		4	12	6		
Starchers (F.)	14			8	6					5	6	1	1			1
Washroom hands	92		3	43	32	11	3		1	2	23	24	18	17	6	1
Totals	977		21	438	395	77	46		18	274	343	163	100	58	16	5

*No employees considered.

TABLE XV. Hours of Labor and Wages Paid in Stores and Factories in MISCELLANEOUS TOWNS OF THE STATE during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
13. *Machine and Repair Shops, Iron and Steel Mills.*																
Blacksmiths	168		32	121	15							3	5	39	101	20
Blacksmiths, apprentices	13			13						5	8					
Blacksmiths, helpers	72		12	60						3	4	27	28	10		
Boiler makers	12		5	7									2	3	6	1
Boiler makers, helpers	3		3									1	2			
Casting chippers	15		5	10								3	5	6	1	
Core makers	17		10	7									2	2	11	2
Core makers, apprentices	2		2							2						
Cupolamen	11		5	6								3	1	3	3	1
Draughtsmen	40		30	8	2						2	1	2	3	12	20
Draughtsmen, apprentices	2		2						1	1						
Flask makers	3		3									1			2	
Foundry helpers	42		17	25								17	19	6		
Machine hands	193		32	126	31		4		2	2	42	58	30	20	36	3
Machinists	509		169	287	53						2	33	30	116	270	58
Machinists, apprentices	92		26	65	1			2	13	51	19	7				
Machinists, helpers	57	1	9	35	12				2	4	4	23	22	2		
Molders	120		62	45	13						2	2	7		95	14
Molders, apprentices	22		13	7	2					7	8	4	2	1		
Molders, helpers	34		8	26								24	9	1		
Stove mounters	2				2						1	1				
Totals	1429	1	445	848	131		4	2	18	75	92	208	166	212	537	119
14. *Metal Workers.**																
15. *Plumbers, Pipe Fitters, Etc.*																
Pipe fitters	17		3	14					1		1		8	3	4	
Plumbers	140		124	11	5						1	1	5	11	40	82
Plumbers, apprentices	12		12						2	2	5	3				
Plumbers, helpers	26		26							3	15	5		3		

Steam fitters	5		4	1								1	1			3
Steam fitters, helpers	4		2	2						2	2					
Totals	204		171	28	5			3	7	24	9	14	18	44	85	
16. *Printing Trades.*																
Bindery girls (F.)	102		25	77				6	81	10	5					
Bookbinders	12		7	5					2			5	2	3		
Bookbinders, apprentices	2		2						1	1						
Compositors	73	9	59	5				1	1	1	7	12	8	22	21	
Compositors (F.)	7		3	4					5		2					
Compositors, apprentices	16	3	13					1	5	5	2	2	1			
Engravers	2		2								1		1			
Linotype operators	39	11	28					1		1		3	4	11	19	
Linotype operators, apprentices	2		2						1				1			
Paper cutters	2		2								1	1				
Press feeders	21	1	13	5	2			1	6	2	4	6	2			
Press feeders (F.)	17		6	10	1				12	4						1
Pressmen	59	2	30	27						2	6	8	19	11	13	
Pressmen, apprentices	10	1	5	4				1	1	5		3				
Proofreaders	1		1										1			
Proofreaders (F.)	6	3	3							1	3	2				
Stereotypers	13	1	4	8						3		3	4	3		
Stereotypers, helpers	2	2						1				1				
Totals	386	33	205	145	3			3	10	125	29	37	41	42	47	54
17. *Sheet Metal Workers.*																
Sheet metal workers	54		30	24								11	12	8	10	13
Sheet metal workers, apprentices	4		4							2	1		1			
Sheet metal workers, helpers	1		1										1			
Tinners	33		25	8							4			3	15	11
Totals	92		60	32						2	5	11	14	11	25	24
18. *Ship Builders, Riggers, Etc.**																
19. *Soap and Candle Workers.*																
Soap makers	20			18	2				1	2	11	3		3		
Soap workers	16			16				1	11	3	1					
Soap wrappers	7		7							7						
Totals	43		7	34	2			1	12	12	12	3		3		

*No employees considered.

TABLE XV. Hours of Labor and Wages Paid in Stores and Factories in MISCELLANEOUS TOWNS OF THE STATE during the Fiscal Year 1909-10.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
20. *Store and Office Employees.*																
Bookkeepers	308	4	103	120	74	3	4	1	1	5	10	20	41	52	59	119
Bookkeepers (F.)	169	3	58	84	23	1			4	18	35	40	46	18	5	3
Cash boys	7			4	3				4	1	2					
Cashiers	14		6	5	3					1			3	3	2	5
Cashiers (F.)	72	1	6	49	15	1			4	21	11	27	7	1		1
Collectors	27	1	8	12	6			1		2		6	7	5	1	5
Drapers	13		1	6	5	1				1	1			1	1	9
Drug clerks	58			3	50	2	3			2	3	3	5	10	9	26
Errand boys	139	13	55	52	15	4		7	61	38	31	2				
Office clerks	206	3	48	88	60		7		8	10	30	44	41	30	16	27
Office clerks (F.)	91	5	13	53	19		1			17	25	30	15	2	2	
Porters and packers	116	4	2	51	47	4	8	1	6	16	29	44	16	4		
Salesmen	924	4	58	468	362	17	15		8	15	54	130	198	216	136	167
Saleswomen (F.)	584		34	438	97	10	5		25	183	190	107	57	12	1	9
Shipping clerks	59		2	40	17						6	21	12	12	4	4
Solicitors	19		11	3	4	1					2		6	6	1	4
Stenographers (F.)	101	2	41	47	11				1	13	19	25	31	6	4	2
Stock clerks	63		5	11	47				1	2	11	32	13	2		2
Stock clerks (F.)	5			3	2				1		3	1				
Telephone operators (F.)	3		3							1	2					
Wrappers (F.)	40		9	27	4				2	23	12	2	1			
Totals	3018	40	463	1564	864	44	43	10	126	369	476	534	499	380	241	383
21. *Structural Iron Workers.**																
22. *Tannery Employees.*																
Finishers	39		4	32	3						3	22	5	5	2	2
Machine hands	48			41	7							30	16	2		
Tanners and curriers	160			160							10	69	53	17	7	4
Tannery workers	244			244						3	7	160	52	17	3	2
Wool pullers	21			21						1		19	1			
Totals	512		4	498	10					4	20	300	127	41	12	8

23. *Textile Workers.**																
24. *Teamsters, Hostlers, Etc.*																
Drivers—																
Bakery	38			13	25					1	1	7	27	2		
Bottle	29		5	20		4						2	13	13	1	
Brewery (keg)	27		13	12	2							2	6	10	3	6
Construction	87		24	55	8						22	32	28	5		
Draying	15				2	13							15			
General delivery	399		14	76	303		6			7	18	113	172	68	15	6
Grocery	104			32	70		2			7	18	39	36	4		
Ice	61			9	52						1	5	32	16	7	
Laundry	120	6	22	45	40	6	1			1	8	12	25	39	15	20
Lumber	209		27	106	76				1	1	2	34	96	64	9	2
Meat	83			35	33	6	9		3	5	23	16	14	13	8	1
Milk	65		19	25	21							9	35	20	1	
Horseshoers	28		4	22	2									2	25	1
Horseshoers, apprentices	4		1	3						2	2					
Stablemen and hostlers	192		5	13	90	11	73		2	1	4	72	86	16	7	4
Warehousemen	24		5	13	6							2	17	5		
Yardmen (feed and fuel)	4				4							1	3			
Totals	1489	6	139	479	734	40	91		6	25	99	346	605	277	91	40
25. *Trunks, Harness, Etc.**																
26. *Upholsterers, Carpet Layers, Etc.**																
27. *Woodworkers.*																
Basket makers	72					28	44				3	69				
Bench hands	186		149	35	2						1	3	29	21	79	53
Bench hands, apprentices	16		15	1							2	9	4	1		
Box machine operators	76		3	15	58					7	27	25	5	12		
Cabinet makers	162		156	4	2					16	43	21	3	4	25	50
Cabinet makers, apprentices	10		9	1						1	1	3	5			
Coopers (hand)	10			10								2	4	1	3	
Coopers (machine)	5			5								3	1	1		
Glaziers	20		16	3	1			1			2	6	4	3	3	1
Lumber hands	328		111	113	104							107	118	101	2	
Mill hands	234		67	124	43				1		5	28	82	52	31	35
Millwrights	3		2	1											2	1
Pattern makers	36		14	21	1				1		1	2	1		10	21
Pattern makers, apprentices	6			6					1	3	2					
Planers	52		40	2	10							3	5	11	22	11

*No employees considered

TABLE XV. Hours of Labor and Wages Paid in Stores and Factories in MISCELLANEOUS TOWNS OF THE STATE during the Fiscal Year 1909-10—Continued.

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
Sanders	11		11										1	9	1	
Sash and door makers	44		32	9	3					1		12	8	5	9	9
Sawyers	97		65	12	20						1		25	39	14	18
Stair builders	6		6												1	5
Stickers	74		73	1						2	1	2	3	2	18	46
Tallymen	33		8	19	6								11	10	9	3
Varnishers and finishers	17		12	1	4								3	1	13	
Wood turners	28		27	1							1		7		4	16
Yard men	18		5	12	1								14		4	
Totals	1544		821	396	255	28	44	1	3	30	90	295	333	273	250	269
28. *Miscellaneous.*																
Art plaster workers	3				3								2		1	
Burlap workers	4			4										4		
Brick workers	15		1	3	7		4						5	7	2	1
Cellar men	24		6	13	5							3	10	6	5	
Chemists	15		7	5	3									2	4	9
Cement workers	16		12		4									16		
Chauffeurs	4		1	1	2								1	2		1
Engineers	156		26	55	61	2	12				1	5	23	40	38	49
Firemen	74		2	48	21		3					9	30	22	12	1
Forewomen (F.)	24		2	9	13						7	9	2	3	1	2
Garage hands	50		4	29	7	3	7			1	4	16	17	5	5	2
Ice pullers and packers	12		1	2	9								7	4	1	
Jewelers	6		2	4						1				1	1	3
Managers and foremen	789	3	187	294	265	8	32					7	30	63	72	617
Millers	58			24	34						1	15	30	5	3	4
Paint, lead, and oil workers	208		31	168		9				9	11	100	50	11	7	20

Paper workers	157	------	6	151	------	------	------	------	------	------	21	110	10	9	3	4
Paper box workers	52	------	------	52	------	------	------	------	------	34	2	9	3	3	1	------
Rubber workers	101	------	------	------	101	------	------	------	------	------	34	44	17	6	------	------
Stone cutters	177	------	165	------	12	------	------	------	------	7	------	------	2	------	12	156
Stone polishers	16	------	16	------	------	------	------	------	------	------	------	------	------	------	16	------
Terra cotta workers	178	------	------	123	55	------	------	------	------	------	------	86	67	11	8	6
Watch makers	5	------	2	3	------	------	------	------	------	------	------	------	------	1	1	3
Watchmen	35	------	1	16	7	------	11	------	------	1	------	8	15	9	2	------
Wood workers	333	------	187	95	51	------	------	------	------	1	20	7	21	68	128	88
Totals	2512	3	659	1099	660	22	69	------	------	54	101	428	342	298	323	966

TABLE XVI. Hours of Labor and Wages Paid in Stores and Factories in a Number of Smaller Towns of the State during the Fiscal Year 1909-10.

(Summarized for Industries.)

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3.	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
Bakery and restaurant employees	474	5	83	93	254	10	29	3	9	94	100	69	47	44	80	28
Breweries and bottling works	110	.....	53	38	17	2	.....	.....	.....	15	1	11	20	32	22	9
Butcher shop and slaughterhouse employees	258	2	6	73	150	17	10	.....	.....	3	1	29	45	111	58	11
Candy, confectionery, etc.	83	.....	11	57	14	1	.....	.....	14	36	15	5	1	4	6	2
Cannery employees.*																
Cigar and tobacco workers.*																
Clothing, shoes, etc.	895	.....	255	572	68	.....	.....	11	54	135	270	179	98	68	54	26
Dairy employees	151	.....	14	48	89	.....	.....	.....	.....	.....	15	109	18	5	2	2
Electrical workers	77	.....	61	11	1	.....	4	.....	1	6	2	3	8	12	35	10
Glass workers.*																
Laborers, general	3783	.....	435	1284	1997	29	38	8	1	115	320	1414	547	1354	24	.....
Laundry workers	977	.....	21	438	395	77	46	.....	18	274	343	163	100	58	16	5
Machine and repair shops, iron and steel mills	1429	1	445	848	131	.....	4	2	18	75	92	208	166	212	537	119
Metal workers.*																
Plumbers, pipe fitters, etc.	204	.....	171	28	5	.....	.....	.....	3	7	24	9	14	18	44	85
Printing trades	386	33	205	145	3	.....	.....	3	10	123	29	37	41	42	47	54
Sheet metal workers	92	.....	60	32	.....	.....	.....	.....	.....	2	5	11	14	11	25	24
Ship builders, riggers, etc.*																
Soap and candle workers	43	.....	7	34	2	.....	.....	.....	1	12	12	12	3	.....	3	.....
Store and office employees	3018	40	463	1564	864	44	43	10	126	369	476	534	499	380	241	383
Structural iron workers.*																
Tannery employees	512	.....	4	498	10	.....	.....	.....	.....	4	20	300	127	41	12	8
Textile workers.*																
Teamsters, hostlers, etc.	1489	6	139	479	734	40	91	.....	6	25	99	346	605	277	91	40
Trunks, harness, etc.*																
Upholsterers, carpet layers, etc.*																
Wood workers	1544	.....	821	396	255	28	44	1	3	30	90	295	333	273	250	269
Miscellaneous	2512	3	659	1099	660	22	69	.....	.....	54	101	428	342	298	323	966
Totals	18037	90	3913	7737	5649	270	378	38	264	1379	2015	4162	3028	3240	1870	2041

TABLE XVII. Hours of Labor and Wages Paid in Stores and Factories, Summarized for the State during the Fiscal Year 1909-10.

(Tabulated by Localities.)

INDUSTRY AND OCCUPATION.	Number of employees considered.	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over.
San Francisco	57996	1987	31047	17265	6339	633	725	47	1860	5046	6274	7404	8525	7259	8031	13550
Los Angeles	41618	402	11744	19153	9063	794	462	68	1674	5445	5507	8484	7248	5143	3536	4513
Oakland	12121	87	4651	5454	1671	14	244	31	338	1066	1410	1526	2177	1771	1587	2215
Sacramento	4491	12	1995	1070	612	434	368	15	274	630	709	690	611	510	397	655
San Jose	3901	25	771	1327	1046	28	704	3	118	557	650	846	456	516	258	497
Stockton	1880	17	451	961	351	29	71	1	74	138	212	290	327	374	221	243
San Diego	1728	11	160	531	589	124	13	2	64	219	219	306	334	245	161	178
Miscellaneous towns	18037	90	3913	7737	6649	270	378	38	264	1379	2015	4162	3028	3240	1870	2041
Totals	141172	2631	55032	53498	25320	2326	2965	205	4666	14480	16996	23708	22706	19058	16061	23892

TABLE XVIII. Hours of Labor and Wages Paid in Stores and Factories in the City of San Francisco during the Fiscal Year 1909-10.

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
Bakery and restaurant employees	435	70	80	55	221	5	4		42	131	241	20	1			
Candy, confectionery, and sugar workers	470		87	383					74	230	135	23	8			
Cannery employees	694		2	100	592				225	329	137	3				
Cigar and tobacco workers	125		43	82					5	95	2	23				
Clothing, shoes, etc.	2726		1713	987	26			35	236	584	662	808	217	86	43	55
Glass workers	49		20	29						16	11	22				
Laundry workers, dyers, etc.	1438		915	356	103	55	9		2	476	705	182	47	24	2	
Printing trades	355	5	340	10					50	38	163	38	35	16	7	8
Sheet metal workers	78			78						54	19	5				
Soap and candle workers	16		1	15					3	17	6			1		
Store and office employees	6330	558	4051	1295	420	1	5	3	466	958	1268	1322	1236	576	223	278
Trunks, harness, etc.	27		10	17					3	17	6			1		
Upholsterers, carpet layers, etc.	42		38	4						1	10	17	12	2		
Wood workers	84		62	22					16	15	39	14				
Miscellaneous	596		216	379	1				66	271	152	45	25	14	5	18
Totals	13465	633	7578	3812	1363	61	18	38	1185	3221	3559	2523	1581	719	280	359

TABLE XIX. Hours of Labor and Wages Paid in Stores and Factories in the State of California during the Fiscal Year 1909-10.
(Tabulated by Localities.)

INDUSTRY AND OCCUPATION.	Number of employees considered	HOURS PER DAY.						WAGES PER WEEK.								
		Less than 8	8	9	10	11	12 and over.	Less than $3	$3 to $5.99	$6 to $8.99	$9 to $11.99	$12 to $14.99	$15 to $17.99	$18 to $20.99	$21 to $24.99	$25 and over
San Francisco	13465	633	7578	3812	1363	61	18	38	1185	3221	3559	2523	1581	719	280	359
Los Angeles	10141	220	4004	4505	1375	25	12	44	1221	3723	2486	1378	802	278	90	119
Oakland	3400	10	1020	1453	697	1	219	31	289	794	978	718	301	146	85	58
Sacramento	1847	------	1036	222	40	372	177	12	221	515	544	288	123	83	28	33
San Jose	1505	2	127	449	396	4	527	2	73	416	440	373	144	44	3	10
Stockton	329	4	73	241	11	------	------	------	4	54	85	113	47	18	3	5
San Diego	368	3	102	133	123	5	2	------	47	121	98	60	26	11	3	2
Miscellaneous towns	1754	14	354	944	381	37	24	11	86	601	514	318	157	34	19	14
Totals	32809	886	14294	11759	4386	505	979	138	3126	9445	8704	5771	3181	1333	511	600

TABLE I. Inspection of Factories and Stores in SAN FRANCISCO, 1909-10.

(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	38	643	590	53	621	568	53	22	22					
Awnings, tents, etc.	5	125	50	75	124	49	75	1	1					
Bags, paper and burlap	5	180	75	105	122	66	56	58	6	43	3	6		
Bakery products, restaurants, etc.	233	2765	2183	582	2751	2171	580	14	11	2	1			
Bar and store fixtures, billiards, etc.	20	467	462	5	447	442	5	20	20					
Blacksmithing and horseshoeing	22	102	102		101	101		1	1					
Boilers, engines, and tanks	9	138	133	5	131	126	5	7	6		1			
Boots and shoes	8	351	249	102	296	217	79	55	26	18	6	5		
Boxes, paper	9	426	258	168	339	238	101	87	20	61		6		
Boxes, wood	4	345	331	14	317	309	8	28	21	6	1			
Brick and tile	3	119	118	1	119	118	1							
Canning	9	1177	457	720	1121	433	688	56	24	32				
Carriages and wagons	31	87	72	15	80	65	15	7	6		1			
Cigars and cigarettes	11	467	323	144	402	310	92	65	4	45	9	7		
Cleaning and dyeing	17	500	229	271	490	224	266	10	4	5	1			
Clothing	70	760	529	231	712	484	228	48	34	1	11	2		
Coffees, spices, etc.	10	667	453	214	612	423	189	55	22	10	8	15		
Coffins, etc.	2	65	41	24	60	40	20	5	1	1		3		
Confectionery	22	1014	496	518	807	417	390	207	64	114	15	14		
Construction work, general contracting, etc.	57	1522	1510	12	1508	1497	11	14	12	1	1			
Cooperage	9	413	323	90	348	285	63	65	36	21	2	6		
Copper and brass goods	14	204	199	5	198	193	5	6	6					
Drugs and chemicals	9	142	125	17	140	124	16	2	1	1				
Electrical goods and supplies	25	599	532	67	572	505	67	27	20		7			
Elevators	6	248	236	12	245	233	12	3	3					
Extracts and perfumes	4	52	25	27	44	22	22	8	2	5	1			
Fixtures, gas and electric	6	250	228	22	228	210	18	22	18	4				
Flouring mill products	10	323	294	29	320	291	29	3	1		2			

Foundry and machine shop products	61	2721	2693	28	2594	2566	28	127	121		6			
Furniture	2	51	50	1	47	46	1	4	4					
Glass and glassware	8	854	794	60	825	772	53	29	22	7				
Gloves	6	146	65	81	144	63	81	2	2					
Harness and saddlery	10	163	155	8	162	154	8	1	1					
Hats, caps, and furnishings	25	1753	288	1465	1654	272	1382	99	16	76		7		
Ice	3	163	160	3	163	160	3							
Ink	3	35	30	5	33	28	5	2	2					
Iron, structural and architectural	33	1373	1338	35	1349	1314	35	24	19		5			
Jewelry and watches	7	566	516	50	491	445	46	75	41	2	28	2	2	
Laundries, hand	44	513	269	244	496	253	243	17	16	1				
Laundries, steam	29	1679	697	982	1665	694	971	14	3	11				
Leather and leather goods	21	698	685	13	692	679	13	6	6					
Liquors, malt	26	662	654	8	654	646	8	8	8					
Lithographing	15	727	611	116	661	563	98	66	47	18	1			
Lumber and milling	101	2334	2292	42	2313	2271	42	21	21					
Machinery	34	957	918	39	909	870	39	48	46		2			
Mattresses and pillows	11	344	298	46	340	294	46	4	4					
Millinery	21	355	82	273	321	62	259	34	16	14	4			
Moldings and frames	2	89	81	8	81	74	7	8	6		1	1		
Oils and grease	6	104	101	3	102	99	3	2	2					
Paints, varnishes, etc.	4	54	50	4	53	50	3	1		1				
Pastes, macaroni, etc.	6	54	52	2	53	51	2	1			1			
Patterns and models	5	39	39		36	36		3	3					
Photographs	3	61	27	34	58	25	33	3	2	1				
Pickles, preserves, sauces, etc.	8	202	124	78	196	123	73	6	1	5				
Plating	3	22	21	1	18	17	1	4	4					
Plumbing, steam and gas fitting	26	227	220	7	224	217	7	3	3					
Printing and binding	99	3047	2584	463	2855	2437	418	192	96	30	51	15		
Roofing	7	176	172	4	172	168	4	4	3		1			
Rubber goods	3	22	16	6	17	11	6	5	5					
Safes and vaults	3	94	60	4	62	58	1	2	2					
Shipwrights, calkers, etc.	16	235	234	1	231	230	1	4	4					
Slaughtering and meat packing	22	531	524	7	525	518	7	6	5		1			
Smelting	3	161	132	32	163	131	32	1	1					
Soap, tallow, glue, etc.	13	198	182	16	196	182	14	2		1		1		
Soda and mineral water	6	70	67	3	70	67	3							
Stencils and stamps	3	86	78	8	71	66	8	12	9		3			
Stone and marble	23	584	578	6	576	570	6	8	8					
Stoves and furnaces	4	127	126	1	125	124	1	2	1		1			
Tinware, sheet metal, etc.	54	1246	1157	89	1153	1080	73	93	65	15	12	1		
Trunks, valises, etc.	3	119	92	27	101	80	21	18	11	6	1			
Miscellaneous	20	587	487	100	580	483	97	7	3	3	1			
Totals	1470	38353	30122	7931	36489	29210	7279	1864	1021	561	189	91	2	

TABLE I. Inspection of Factories and Stores in SAN FRANCISCO, 1909-10—Continued.

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Wholesale.														
Boots and shoes	11	172	149	23	168	145	23	4	3		1			
Cigars and tobaccos	20	362	317	45	359	314	45	3	2		1			
Clothing and furnishings	21	362	319	43	344	304	40	18	14	3	1			
Commission merchants	91	1072	840	232	1065	833	232	7	6		1			
Drugs and chemicals	10	308	235	73	282	210	72	26	16	1	9			
Dry goods	14	349	318	31	321	290	31	28	26		2			
Furniture	9	106	85	21	105	84	21	1	1					
Gas and electric goods	14	166	132	34	155	121	34	11	9		2			
Groceries	42	917	797	120	899	780	119	18	17	1				
Hardware	35	1569	1339	230	1438	1211	227	131	93	3	34		1	
Household goods	7	170	149	21	157	136	21	13	12		1			
Importers	9	74	55	19	72	54	18	2	1	1				
Junk	7	121	103	18	121	103	18							
Leather	6	69	57	12	64	52	12	5	5					
Liquors	81	982	881	101	966	869	97	16	12	4				
Machinery and implements	19	259	210	49	255	207	48	4	2	1	1			
Meat	4	138	123	15	135	120	15	3	3					
Millinery	3	41	29	12	38	26	12	3	1		2			
Paints, oils, wall paper, etc	12	142	114	28	137	109	28	5	3		2			
Paper	7	242	216	26	230	204	26	12	12					
Rubber goods	15	178	153	25	169	144	25	9	8		1			
Stationery	2	57	50	7	57	50	7							
Miscellaneous	73	1282	1074	208	1222	1047	175	60	24	31	3	2		
Totals	512	9138	7745	1393	8759	7413	1346	379	270	45	61	2	1	
Retail.														
Boots and shoes	16	267	233	34	246	212	34	21	12		9			
Butcher shops and markets	104	754	664	90	697	607	90	57	56		1			
Clothing and furnishings	70	1428	699	729	1245	589	656	183	78	59	31	14	1	
Confectionery	5	122	20	102	121	19	102	1			1			

Department stores	10	2748	1138	1610	2351	1012	1339	397	51	155	75	116		
Dry goods	28	1638	531	1107	1414	443	971	224	35	47	51	89	2	
Drug stores	50	497	390	107	432	325	107	65	49		15		1	
Florists and nurseries	15	91	83	8	87	80	7	4	2	1	1			
Furniture	25	453	410	43	443	400	43	10	8		2			
Groceries	62	443	364	79	404	325	79	39	39					
Hardware	37	402	343	59	372	315	57	30	26	2	2			
Household goods, crockery, glassware, etc.	9	343	199	144	279	161	118	64	24	23	14	3		
Jewelry	3	19	8	11	17	6	11	2	2					
Leather goods	7	40	34	6	35	29	6	5	5					
Music, musical instruments, etc.	9	308	252	56	277	224	53	31	28	3				
Stationery	18	216	161	55	187	133	54	29	22	1	6			
Miscellaneous	44	595	515	80	562	482	80	33	29		4			
Totals	512	10364	6044	4320	9169	5362	3807	1195	466	291	212	222	4	
Miscellaneous.														
Banks	12	295	273	22	292	270	22	3	3					
Feed and fuel	48	606	588	18	605	587	18	1	1					
Lumber and shipping	28	155	121	34	151	118	33	4	3	1				
Milk depots	21	407	375	32	403	373	30	4	2	2				
Offices	177	2403	1771	632	2293	1677	616	110	68	15	25	1	1	
Teaming, livery and storage	138	2005	1973	32	1989	1957	32	16	16					
General	42	388	340	48	381	333	48	7	7					
Totals	466	6259	5441	818	6114	5315	799	145	100	18	25	1	1	
Recapitulation.														
Manufacturing	1470	38353	30422	7931	36489	29210	7279	1864	1021	561	189	91	2	
Wholesale	512	9138	7745	1393	8759	7413	1346	379	270	45	61	2	1	
Retail	512	10364	6044	4320	9169	5362	3807	1195	466	291	212	222	4	
Miscellaneous	466	6259	5441	818	6114	5315	799	145	100	18	25	1	1	
Grand totals	2960	64114	49652	14462	60531	47300	13231	3583	1857	915	487	316	8	

TABLE II. Inspection of Factories and Stores in LOS ANGELES, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	71	933	868	65	882	817	65	51	47		4			
Awnings, tents, etc.	4	198	109	89	184	100	84	14	9	5				
Bakery products, restaurants, etc.	158	2424	1607	817	2387	1572	815	37	32	2	2		1	
Bar and store fixtures, billiards, etc.	11	195	191	4	188	184	4	7	5		2			
Boilers, engines and tanks	3	72	72		72	72								
Boots and shoes	5	62	53	9	58	51	7	4	1	2	1			
Boxes, paper	3	121	50	71	89	42	47	32	7	20	1	4		
Boxes, wood	2	57	55	2	49	47	2	8	8					
Brick and tile	14	614	606	8	574	566	8	40	27		13			
Brooms and brushes	3	76	73	3	70	67	3	6	6					
Canning	7	395	147	248	367	142	225	28	5	23				
Carriages and wagons	13	135	131	4	127	123	4	8	8					
Cigars and cigarettes	3	176	122	54	154	122	32	22		15		7		
Cleaning and dyeing	16	451	268	183	435	264	171	16	3	11	1	1		
Clothing	90	1381	721	660	1328	693	635	53	24	19	4	6		
Confectionery	25	1459	733	726	1322	710	612	137	20	103	3	11		
Construction work, general contracting, etc.	36	3244	3217	27	3231	3206	25	13	11	2				
Cooperage	2	35	35		33	33		2	1		1			
Copper and brass goods	4	68	65	3	67	64	3	1	1					
Drugs and chemicals	3	52	27	25	49	26	23	3			1	2		
Electrical goods and supplies	14	255	234	21	225	207	18	30	27	3				
Fixtures, gas and electric	14	285	272	13	261	250	11	24	21	2	1			
Flouring mill products	8	251	227	24	244	223	21	7	3	3	1			
Foundry and machine shop products	37	1936	1897	39	1875	1840	35	61	57	4				
Furniture	11	358	324	34	346	312	34	12	12					
Glass and glassware	7	111	107	4	99	95	4	12	6		6			
Harness and saddlery	5	178	161	17	162	150	12	16	10	5	1			
Hats, caps, and furnishings	13	492	143	349	480	135	345	12	6	4	2			
Ice	5	396	387	9	394	386	8	2	1	1				
Iron, structural and architectural	5	232	227	5	227	223	4	5	4	1				

Jewelry and watches	20	330	278	52	308	259	49	22	12	3	7			
Laundries, hand	4	35	12	23	34	12	22	1		1				
Laundries, steam	22	2021	682	1339	1995	673	1322	26	7	12	2	5		
Leather and leather goods	3	77	20	57	72	15	57	5	5					
Liquors, malt	8	357	353	4	354	350	4	3	1		2			
Lithographing	9	233	186	47	205	164	41	28	14	6	8			
Lumber and milling	55	3405	3363	42	3321	3281	40	84	74	2	8			
Machinery	22	679	660	19	650	633	17	29	27	2				
Mattresses and pillows	3	80	66	14	73	61	12	7	5	2				
Millinery	26	360	41	319	322	34	288	38	6	29	1	2		
Moldings	5	75	68	7	73	66	7	2	2					
Oil and grease	5	82	80	2	81	79	2	1	1					
Paints and varnishes	2	26	25	1	26	25	1							
Photographs	4	31	15	16	31	15	16							
Pickles, preserves, sauces, etc.	7	295	158	137	280	157	123	15	1	14				
Plating	2	14	13	1	10	9	1	4	4					
Plumbing, steam and gas fitting	19	282	273	9	272	263	9	10	10					
Printing and binding	58	2094	1774	320	1794	1502	292	300	177	25	31	3	64	
Rubber goods	8	68	59	9	65	56	9	3	2		1			
Slaughtering and meat packing	11	855	813	42	805	774	31	50	26	10	10	1	3	
Soda and mineral waters	3	27	26	1	27	26	1							
Stencils and stamps	3	38	35	3	33	30	3	5	4		1			
Stone and marble	13	259	257	2	258	256	2	1	1					
Tinware, sheet metal, etc.	22	619	613	6	593	587	6	26	24		2			
Trunks, valises, etc.	8	61	53	8	56	48	8	5	2		3			
Miscellaneous	26	400	308	92	364	274	90	36	23	2	9		2	
Totals	960	29445	23360	6085	28081	22371	5710	1364	790	333	129	42	70	
Wholesale.														
Boots and shoes	4	44	37	7	44	37	7							
Cigars and tobaccos	11	139	129	10	139	129	10							
Clothing and furnishings	7	261	72	189	237	63	174	24	8	13	1	2		
Commission merchants	12	261	238	23	259	237	22	2	1	1				
Drugs and chemicals	7	367	311	56	323	273	50	44	25	6	13			
Dry goods	2	59	55	4	50	47	3	9	8	1				
Furniture	3	60	50	10	47	40	7	13	10	2		1		
Gas and electric goods	5	83	63	20	78	59	19	5	4	1				
Groceries	32	954	783	171	911	759	152	43	18	16	6	3		
Hardware	21	859	776	83	828	750	78	31	23	5	3			
Jewelry	3	29	25	4	22	18	4	7	5		2			
Junk	3	50	30	20	50	30	20							
Liquors	5	55	51	4	54	51	3	1		1				
Machinery and implements	22	413	371	42	406	364	42	7	6		1			
Paints, oils, wall paper, etc.	11	186	173	13	181	168	13	5	5					

TABLE II. Inspection of Factories and Stores in LOS ANGELES, 1909-10—Continued.

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Wholesale—Continued.														
Paper	4	245	224	21	236	215	21	9	9					
Rubber goods	7	72	62	10	60	51	9	12	11	1				
Stationery	3	41	33	8	38	31	7	3	2	1				
Miscellaneous	36	358	298	60	336	276	60	22	18		4			
Totals	201	4536	3781	755	4299	3598	701	237	153	48	30	6		
Retail.														
Boots and shoes	23	322	280	42	312	270	42	10	5		5			
Butcher shops and markets	15	235	216	19	232	213	19	3	3					
Clothing and furnishings	41	4943	4490	453	4901	4452	449	42	28	4	8		2	
Department stores	8	3160	1006	2154	2742	913	1829	418	33	176	57	148	3	1
Dry goods	8	1578	503	1075	1261	388	873	317	59	142	54	58	2	2
Drug stores	18	235	195	40	201	161	40	34	29		5			
Florists and nurseries	11	124	100	24	118	94	24	6	4		2			
Furniture	28	825	720	105	814	709	105	11	7		4			
Groceries	22	1097	960	137	1072	936	136	25	19		5	1		
Hardware	13	144	130	14	139	125	14	5	4		1			
Household goods, crockery, glassware, etc.	4	180	133	47	154	109	45	26	22	2	2			
Music, musical instruments, etc.	10	270	237	33	260	228	32	10	9	1				
Paints, oils, wall paper, etc.	6	64	58	6	62	56	6	2	2					
Stationery	12	216	169	47	196	149	47	20	17		3			
Miscellaneous	25	279	225	54	264	213	51	15	8	3	4			
Totals	244	13672	9422	4250	12728	9016	3712	944	249	328	150	207	7	3

Miscellaneous.														
Feed and fuel	11	111	102	9	111	102	9							
Milk depots	5	338	314	24	336	312	24	2	2					
Teaming, livery, and storage	31	741	728	13	727	714	13	14	12		2			
General	62	535	401	134	535	401	134							
Totals	109	1725	1545	180	1709	1529	180	16	14		2			
Recapitulation.														
Manufacturing	960	29445	23360	6085	28081	22371	5710	1364	790	333	129	42	70	
Wholesale	201	4536	3781	755	4299	3598	701	237	153	48	30	6		
Retail	244	13672	9422	4250	12728	9016	3712	944	249	328	150	207	7	3
Miscellaneous	109	1725	1545	180	1709	1529	180	16	14		2			
Grand totals	1514	49378	38108	11270	46817	36514	10303	2561	1206	709	311	255	77	3

TABLE III. Inspection of Factories and Stores in OAKLAND, 1909-10.

(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS. Total	Male	Female	MINORS. Total	16 to 18 years. Male	16 to 18 years. Female	14 to 16 years. Male	14 to 16 years. Female	12 to 14 years. Male	12 to 14 years. Female
Manufacturing.														
Automobiles, repairing, etc.	20	151	135	16	139	123	16	12	12					
Awnings, tents, etc.	2	34	26	8	34	26	8							
Bakery products, restaurants, etc.	56	665	577	88	662	574	88	3	3					
Bar and store fixtures, billiards, etc.	4	87	86	1	78	77	1	9	9					
Boxes, wood	2	90	89	1	80	79	1	10	10					
Brick and tiles	5	129	129		129	129								
Canning	3	1175	334	841	505	245	260	670	25	450	32	96	32	35
Carriages and wagons	5	46	45	1	45	44	1	1	1					
Cleaning and dyeing	4	84	35	49	84	35	49							
Clothing	10	139	102	37	135	99	36	4	2	1	1			
Confectionery	7	167	62	105	160	60	100	7	2	5				
Construction work, general contracting, etc.	13	660	650	10	659	649	10	1	1					
Copper and brass goods	2	18	18		17	17		1	1					
Drugs and chemicals	2	138	135	3	137	134	3	1	1					
Electrical goods and supplies	5	52	48	4	48	44	4	4	4					
Fixtures, gas and electric	3	42	39	3	41	38	3	1	1					
Flouring mill products	2	41	39	2	40	38	2	1	1					
Foundry and machine shop products	10	776	769	7	767	760	7	9	9					
Glass and glassware	3	26	23	3	25	22	3	1	1					
Gloves	3	76	40	36	69	36	33	7	4	3				
Harness and saddlery	3	17	15	2	17	15	2							
Hats, caps, and furnishings	2	47	13	34	44	12	32	3	1	2				
Iron, structural and architectural	3	66	66		53	53		13	13					
Jewelry and watches	7	94	83	11	76	66	10	18	16	1	1			
Laundries, hand	5	88	45	43	88	45	43							
Laundries, steam	11	626	260	366	619	253	366	7	6		1			
Liquors, malt	6	113	113		113	113								
Lithographing	2	18	14	4	15	14	1	3		3				
Lumber and milling	32	1405	1385	20	1338	1319	19	67	66	1				
Machinery	4	239	232	7	232	228	4	7	4	3				

Millinery	15	167	32	135	147	24	123	20	4	12	3	1	
Paints, varnishes, etc.	3	122	118	4	122	118	4						
Pastes, macaroni, etc.	2	19	19		19	19							
Pickles, preserves, sauces, etc.	4	45	31	14	45	31	14						
Plumbing, steam and gas fitting	3	63	60	3	63	60	3						
Printing and binding	14	322	264	58	287	231	56	35	21	2	12		
Rubber goods	2	49	47	2	47	45	2	2	2				
Soda and mineral water	2	28	28		28	28							
Tinware, sheet metal, etc.	3	26	25	1	24	23	1	2	2				
Miscellaneous	16	390	277	113	342	264	78	48	12	21	1	14	
Totals	300	8540	6508	2032	7573	6190	1383	967	234	504	51	110	33	35
Wholesale.													
Commission merchants	20	197	165	32	195	164	31	2	1	1			
Drugs and chemicals	2	19	13	6	19	13	6						
Furniture	2	25	18	7	25	18	7						
Groceries	10	93	84	9	92	83	9	1	1				
Hardware	7	80	70	10	80	70	10						
Junk	4	27	26	1	26	25	1	1	1				
Liquors	5	49	45	4	49	45	4						
Machinery and implements	3	35	34	1	35	34	1						
Paints, oils, wall paper, etc.	3	32	29	3	32	29	3						
Miscellaneous	11	152	137	15	150	135	15	2	2				
Totals	67	709	621	88	703	616	87	6	5	1			
Retail.													
Boots and shoes	9	74	64	10	70	60	10	4	4				
Butcher shops and markets	25	235	217	18	230	212	18	5	5				
Clothing and furnishings	25	491	263	228	433	222	211	58	29	17	12		
Department stores	2	244	83	161	159	44	115	85	30	43	9	3	
Dry goods	5	836	251	585	694	207	487	112	9	47	35	51	
Drug stores	8	173	127	46	143	97	46	30	24		6		
Florists and nurseries	5	39	36	3	33	30	3	6	6				
Furniture	16	304	256	48	299	251	48	5	3		2		
Groceries	20	259	223	36	241	206	35	18	14	1	3		
Hardware	9	126	112	14	105	91	14	21	21				
Household goods, crockery, glassware, etc.	4	93	51	42	84	44	40	9	5	2	2		
Jewelry	3	17	14	3	16	13	3	1	1				
Music and musical instruments	9	108	92	16	103	87	16	5	3		2		
Paints, oils, wall paper, etc.	3	45	36	9	44	36	8	1		1			
Stationery	6	81	53	28	66	44	22	15	8	6	1		
Miscellaneous	17	143	121	22	139	118	21	4	3	1			
Totals	166	3268	1999	1269	2859	1762	1097	109	165	118	72	54	

TABLE III. Inspection of Factories and Stores in OAKLAND, 1909-10—Continued.

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total.	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Miscellaneous.														
Feed and fuel	20	164	153	11	163	153	10	1	-------	1	-------	-------	-------	-------
Milk depots	7	141	109	32	139	108	31	2	1	1	-------	-------	-------	-------
Teaming, livery, and storage	36	359	345	14	359	345	14	-------	-------	-------	-------	-------	-------	-------
General	4	68	4	64	63	4	59	5	-------	5	-------	-------	-------	-------
Totals	67	732	611	121	724	610	114	8	1	7	-------	-------	-------	-------
Recapitulation.														
Manufacturing	300	8540	6508	2032	7573	6190	1383	967	234	504	51	110	33	35
Wholesale	67	709	621	88	703	616	87	6	5	1	-------	-------	-------	-------
Retail	166	3268	1999	1269	2859	1762	1097	409	165	118	72	54	-------	-------
Miscellaneous	67	732	611	121	724	610	114	8	1	7	-------	-------	-------	-------
Grand totals	600	13249	9739	3510	11859	9178	2681	1390	405	630	123	164	33	35

TABLE IV. Inspection of Factories and Stores in SACRAMENTO, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Bakery products, restaurants, etc.	12	170	120	50	165	117	48	5	3	2				
Canning	4	835	305	530	618	223	395	217	30	70	27	50	25	15
Carriages and wagons	4	33	33		31	31		2	2					
Cigars and cigarettes	3	48	37	11	46	35	11	2	2					
Clothing	4	44	34	10	43	33	10	1			1			
Confectionery	3	113	45	68	91	42	49	22	3	15		4		
Construction work, general contracting, etc.	2	30	29	1	30	29	1							
Drugs and chemicals	2	23	17	6	21	16	5	2	1			1		
Foundry and machine shop products	3	54	54		52	52		2	2			1		
Furniture	2	24	22	2	24	22	2							
Harness and saddlery	2	79	75	4	77	73	4	2	2					
Liquors, malt	2	204	204		194	194		10	10					
Lumber and milling	3	66	65	1	65	64	1	1	1					
Plumbing, steam and gas fitting	3	61	57	4	47	43	4	14	10		3		1	
Printing and binding	8	269	244	25	180	155	25	89	33		48		8	
Slaughtering and meat packing	3	64	60	4	63	59	4	1			1			
Soda and mineral water	2	21	20	1	18	18		3	2	1				
Tinware, sheet metal, etc.	2	50	50		50	50								
Miscellaneous	7	192	141	51	183	132	51	9	9					
Totals	71	2380	1612	768	1998	1388	610	382	110	88	80	55	34	15
Wholesale.														
Commission merchants	4	88	84	4	86	82	4	2	2					
Groceries	4	106	100	6	105	99	6	1			1			
Hardware	4	183	155	28	168	143	25	15	10	3	1		1	
Liquors	6	36	33	3	35	32	3	1	1					
Machinery and implements	2	19	16	3	19	16	3							
Miscellaneous	4	108	90	18	105	87	18	3	3					
Totals	24	540	478	62	518	459	59	22	16	3	2		1	

TABLE IV. Inspection of Factories and Stores in SACRAMENTO, 1909-10—Continued.

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS. Total	ADULTS. Male	ADULTS. Female	MINORS. Total	MINORS. 16 to 18 years. Male	MINORS. 16 to 18 years. Female	MINORS. 14 to 16 years. Male	MINORS. 14 to 16 years. Female	MINORS. 12 to 14 years. Male	MINORS. 12 to 14 years. Female
Retail.														
Boots and shoes	2	24	19	5	23	18	5	1	1					
Butcher shops and markets	3	22	20	2	21	19	2	1	1					
Clothing and furnishings	3	30	23	7	21	14	7	9	5		2		2	
Department stores	4	1024	275	749	805	246	559	219	19	143	5	47	5	
Drug stores	19	104	96	8	68	60	8	36	29		1		6	
Dry goods	2	209	35	174	184	29	155	25	5	19	1			
Furniture	5	236	171	65	231	166	65	5	5					
Groceries	7	68	58	10	61	51	10	7	6		1			
Hardware	2	35	34	1	34	33	1	1	1					
Jewelry	3	18	17	1	18	17	1							
Miscellaneous	11	116	85	31	108	78	30	8	2	1	5			
Totals	61	1886	833	1053	1574	731	843	312	74	163	15	47	13	
Miscellaneous.														
Milk depots	2	44	32	12	42	31	11	2	1	1				
Teaming, livery, and storage	7	105	102	3	103	100	3	2	2					
Totals	9	149	134	15	145	131	14	4	3	1				
Recapitulation.														
Manufacturing	71	2380	1612	768	1998	1388	610	382	110	88	80	55	34	15
Wholesale	24	540	478	62	518	459	59	22	16	3	2		1	
Retail	61	1886	833	1053	1574	731	843	312	74	163	15	47	13	
Miscellaneous	9	149	134	15	145	131	14	4	3	1				
Grand totals	165	4955	3057	1898	4235	2709	1526	720	203	255	97	102	48	15

TABLE V. Inspection of Factories and Stores in SAN JOSE, 1909-10.

(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	7	79	74	5	76	71	5	3	3					
Bakery products, restaurants, etc.	28	271	177	94	263	172	91	8	5	3				
Brick and tile	2	35	34	1	35	34	1							
Canning	4	1105	287	818	870	195	675	235	49	85	33	58	10	
Carriages and wagons	5	40	39	1	36	35	1	4	4					
Cigars and cigarettes	3	21	20	1	20	19	1	1	1					
Cleaning and dyeing	3	49	31	18	49	31	18							
Confectionery	4	47	21	26	31	20	11	16	1	15				
Electrical goods and supplies	2	28	25	3	28	25	3							
Foundry and machine shop products	2	64	64		63	63		1	1					
Gloves	2	20	8	12	18	6	12	2	1		1			
Laundries, hand	2	15	4	11	15	4	11							
Laundries, steam	5	194	90	104	190	89	101	4	1	3				
Liquors, malt	3	72	72		70	70		2	2					
Lumber and milling	5	236	232	4	225	221	4	11	7		4			
Machinery	3	110	107	3	101	98	3	9	9					
Millinery	5	55	7	48	53	5	48	2	2					
Pastes, macaroni, etc.	2	13	13		13	13								
Plumbing, steam and gas fitting	4	60	57	3	55	52	3	5	5					
Printing and binding	9	264	243	21	162	141	21	102	43		18		41	
Soda and mineral waters	2	11	11		14	14								
Miscellaneous	9	83	73	10	83	73	10							
Totals	111	2875	1692	1183	2470	1451	1019	405	134	106	56	58	51	

TABLE V. Inspection of Factories and Stories in SAN JOSE, 1909-10.

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Wholesale.														
Commission merchants	2	15	15		15	15								
Groceries	4	52	46	6	48	42	6	4	4					
Machinery and implements	4	22	20	2	22	20	2							
Miscellaneous	6	63	61	2	62	60	2	1	1					
Totals	16	152	142	10	147	137	10	5	5					
Retail.														
Boots and shoes	4	42	35	7	41	34	7	1			1			
Butcher shops and markets	8	64	60	4	59	55	4	5	5					
Clothing and furnishings	14	215	94	121	204	83	121	11	8		2		1	
Department stores	3	160	67	93	136	57	79	24	10	14				
Dry goods	3	89	32	57	85	28	57	4	4					
Furniture	4	65	59	6	62	56	6	3	3					
Groceries	10	143	135	8	141	134	7	2	1	1				
Hardware	2	12	10	2	11	9	2	1	1					
Music, musical instruments, etc.	2	11	7	4	10	6	4	1	1					
Paints, oils, wall paper, etc.	2	14	12	2	13	11	2	1	1					
Miscellaneous	10	95	78	17	89	73	16	6	4	1	1			
Totals	62	910	589	321	851	546	305	59	38	16	4		1	
Miscellaneous.														
Banks	6	58	55	3	58	55	3							
Feed and fuel	5	31	26	5	31	26	5							
Teaming, livery, and storage	10	137	134	3	137	134	3							
Totals	21	226	215	11	226	215	11							

Recapitulation.												
Manufacturing	111	2875	1692	1183	2470	1451	1019	405	134	106	56	58	51
Wholesale	16	152	142	10	147	137	10	5	5				
Retail	62	910	589	321	851	546	305	59	38	16	4		1
Miscellaneous	21	226	215	11	226	215	11						
Grand totals	210	4163	2638	1525	3694	2349	1345	469	177	122	60	58	52

TABLE VI. Inspection of Factories and Stores in STOCKTON, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS. Total	Male	Female	MINORS. Total	16 to 18 years. Male	16 to 18 years. Female	14 to 16 years. Male	14 to 16 years. Female	12 to 14 years. Male	12 to 14 years. Female
Manufacturing.														
Bakery products, restaurants, etc.	10	80	70	10	80	70	10							
Clothing	4	46	39	7	46	39	7							
Flouring mill products	4	235	204	31	235	204	31							
Foundry and machine shop products	4	43	41	2	42	40	2	1	1					
Harness and saddlery	2	11	11		10	10		1	1					
Laundries, steam	4	153	44	109	140	44	96	13		13				
Lumber and milling	5	70	67	3	69	66	3	1	1					
Machinery	5	521	508	13	510	497	13	11	11					
Millinery	2	28	5	23	24	4	20	4	1	3				
Plumbing, steam and gas fitting	2	19	18	1	19	18	1							
Miscellaneous	6	190	137	53	140	118	22	50	10	18	7	10	2	3
Totals	48	1396	1144	252	1315	1110	205	81	25	34	7	10	2	3
Wholesale.														
Miscellaneous	6	70	60	10	70	60	10							
Totals	6	70	60	10	70	60	10							
Retail.														
Boots and shoes	6	39	35	4	36	32	4	3	2		1			
Butcher shops and markets	3	28	26	2	25	23	2	3	3					
Clothing and furnishings	6	90	50	40	79	41	38	11	9	2				
Department stores	2	60	32	28	42	24	18	18	7	9	1	1		
Dry goods	4	63	31	32	60	28	32	3	3					
Drug stores	14	78	73	5	64	59	5	14	12		2			
Furniture	3	34	30	4	33	29	4	1	1					
Hardware	4	37	34	3	37	34	3							
Paints, oils, wall paper, etc.	3	49	45	4	49	45	4							
Miscellaneous	3	20	15	5	20	15	5							
Totals	48	498	371	127	445	330	115	53	37	11	4	1		

Miscellaneous.														
Feed and fuel	2	16	15	1	16	15	1							
Teaming, livery, and storage	5	46	43	3	45	42	3	1	1					
General	3	23	21	2	23	21	2							
Totals	10	85	79	6	84	78	6	1	1					
Recapitulation.														
Manufacturing	48	1396	1144	252	1315	1110	205	81	25	34	7	10	2	3
Wholesale	6	70	60	10	70	60	10							
Retail	48	498	371	127	445	330	115	53	37	11	4	1		
Miscellaneous	10	85	79	6	84	78	6	1	1					
Grand totals	112	2049	1654	395	1914	1578	336	135	63	45	11	11	2	3

TABLE VII. Inspection of Factories and Stores in SAN DIEGO, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Bakery products, restaurants, etc.	12	137	114	23	136	113	23	1			1			
Cleaning and dyeing	2	19	12	7	18	11	7	1	1					
Confectionery	3	33	15	18	31	14	17	2	1	1				
Electrical goods and supplies	2	31	29	2	31	29	2							
Foundry and machine shop products	2	90	89	1	89	88	1	1	1					
Laundries, steam	3	143	57	86	143	57	86							
Lumber and milling	3	124	124		124	124								
Plumbing, steam, and gas fitting	2	20	19	1	19	18	1	1	1					
Stone and marble	2	56	56		56	56								
Tinware, sheet metal, etc.	3	50	49	1	46	45	1	4	4					
Miscellaneous	15	240	204	36	232	197	35	8	3	1	4			
Totals	49	943	768	175	925	752	173	18	11	2	5			
Wholesale.														
Commission merchants	3	23	21	2	23	21	2							
Groceries	3	96	88	8	95	88	7	1		1				
Miscellaneous	3	76	70	6	73	67	6	3	3					
Totals	9	195	179	16	191	176	15	4	3	1				
Retail.														
Clothing and furnishings	5	200	107	93	168	77	91	32	15	2	14		1	
Department stores	2	29	3	26	20	3	17	9		8		1		
Dry goods	4	74	27	47	66	22	44	8	3	3	2			
Drug stores	5	23	22	1	15	14	1	8	8					
Furniture	3	38	34	4	37	33	4	1	1					
Groceries	3	72	51	21	71	50	21	1			1			
Hardware	3	52	50	2	52	50	2							
Household goods, crockery, glassware, etc.	3	9	8	1	8	7	1	1	1					

Music, musical instruments, etc.	2	17	13	4	15	12	3	2	1	1				
Stationery	2	22	7	15	20	6	14	2	1	1				
Miscellaneous	8	129	122	7	122	115	7	7	6		1			
Totals	40	665	444	221	594	389	205	71	36	15	18	1	1	
Recapitulation.														
Manufacturing	49	943	768	175	925	752	173	18	11	2	5			
Wholesale	9	195	179	16	191	176	15	4	3	1				
Retail	40	665	444	221	594	389	205	71	36	15	18	1	1	
Totals	98	1803	1391	412	1710	1317	393	93	50	18	23	1	1	

TABLE VIII. Inspection of Factories and Stores in FRESNO, 1909-10.

(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	1	20	19	1	20	19	1							
Bakery products, restaurants, etc.	3	42	30	12	41	29	12	1	1					
Confectionery	1	15	15		15	15								
Electrical goods and supplies	1	4	3	1	4	3	1							
Flouring mill products	1	23	23		22	22		1	1					
Foundry and machine shop products	1	24	24		22	22		2	2					
Harness and saddlery	2	32	30	2	31	29	2	1	1					
Laundries, steam	2	71	30	41	71	30	41							
Liquors, malt	1	44	43	1	41	40	1	3			3			
Lumber and milling	6	109	104	5	109	104	5							
Machinery	2	38	36	2	35	33	2	3	3					
Plumbing, steam, and gas fitting	2	57	54	3	57	54	3							
Printing and binding	3	68	61	7	48	41	7	20	4		16			
Slaughtering and meat packing	2	29	28	1	29	28	1							
Soda and mineral water	1	14	13	1	13	12	1	1	1					
Totals	29	590	513	77	558	481	77	32	13		19			
Wholesale and Retail—Stores and Offices.														
Clothing and furnishings, retail	8	118	71	47	94	61	33	24	3	14	7			
Commission merchants	1	15	12	3	15	12	3							
Department stores	4	157	71	86	121	59	62	36	5	22	7	2		
Drug stores	2	13	11	2	11	9	2	2			2			
Feed and fuel	1	17	16	1	17	16	1							
Furniture, retail	2	30	27	3	29	26	3	1	1					
Groceries, retail	1	20	13	7	19	12	7	1			1			
Hardware, retail	2	26	24	2	24	22	2	2	2					
Liquors, wholesale	1	22	21	1	22	21	1							
Milk depots	1	34	30	4	32	28	4	2	2					

Teaming, livery, and storage	3	33	32	1	33	32	1							
Miscellaneous	1	16	14	2	15	13	2	1			1			
Totals	27	501	342	159	432	311	121	69	13	36	18	2		
Recapitulation.														
Factories	29	590	513	77	558	481	77	32	13		19			
Stores and offices	27	501	342	159	432	311	121	69	13	36	18	2		
Grand totals	56	1091	855	236	990	792	198	101	26	36	37	2		

TABLE IX. Inspection of Factories and Stores in BERKELEY, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	2	14	13	1	14	13	1							
Bakery products, restaurants, etc.	2	76	67	9	75	66	9	1	1					
Blacksmithing and horseshoeing	2	14	14		14	14								
Boilers, engines, and tanks	1	11	11		11	11								
Canning	1	171	33	138	165	32	133	6	1			5		
Cleaning and dyeing	1	23	12	11	23	12	11							
Confectionery	1	55	29	26	42	27	15	13	2	11				
Construction work, general contracting, etc.	2	51	51		51	51								
Drugs and chemicals	2	27	26	1	27	26	1							
Elevators	1	99	99		99	99								
Flouring mill products	1	10	10		10	10								
Foundry and machine shop products	1	61	61		58	58		3	3					
Hats, caps, and furnishings	1	64	11	53	61	10	51	3	1	2				
Ink	1	26	26		26	26								
Iron, structural and architectural	1	27	26	1	22	21	1	5	2		3			
Laundries, hand	1	8	6	2	8	6	2							
Laundries, steam	2	76	31	45	76	31	45							
Leather and leather goods	1	23	23		23	23								
Liquors, malt	1	12	11	1	12	11	1							
Lumber and milling	10	204	202	2	204	202	2							
Machinery	2	96	93	3	95	92	3	1	1					
Mattresses and pillows	1	6	6		6	6								
Oils and grease	2	52	52		52	52								
Plumbing, steam, and gas fitting	2	9	7	2	9	7	2							
Printing and binding	4	51	42	9	45	36	9	6	4		1		1	
Slaughtering and meat packing	6	151	151		148	148		3	3					
Soap, tallow, glue, etc.	2	121	106	15	109	103	6	12	3	9				
Miscellaneous	5	104	96	8	104	96	8							
Totals	59	1642	1315	327	1589	1289	300	53	21	22	4	5	1	

Wholesale and Retail—Stores and Offices.														
Clothing and furnishings, retail	1	8	6	2	8	6	2							
Dry goods, retail	3	59	26	33	56	23	33	3	3					
Feed and fuel	1	5	5		5	5								
Groceries, retail	1	25	20	5	25	20	5							
Teaming, livery, and storage	7	47	47		47	47								
Totals	13	144	104	40	141	101	40	3	3					
Recapitulation.														
Factories	59	1642	1315	327	1589	1289	300	53	21	22	4	5	1	
Stores and offices	13	144	104	40	141	101	40	3	3					
Grand totals	72	1786	1419	367	1730	1390	340	56	24	22	4	5	1	

TABLE X. Inspection of Factories and Stores in ALAMEDA, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total.	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	1	3	3		3	3								
Bakery products, restaurants, etc.	8	43	31	12	43	31	12							
Brick and tile	2	138	138		138	138								
Cleaning and dyeing	1	6	4	2	6	4	2							
Clothing	1	3	2	1	3	2	1							
Confectionery	2	9	5	4	8	4	4	1	1					
Construction work, general contracting, etc.	4	71	69	2	71	69	2							
Jewelry and watches	1	3	3		3	3								
Laundries	2	55	31	24	55	31	24							
Lumber and milling	2	15	14	1	15	14	1							
Machinery	1	17	16	1	15	14	1	2	2					
Paints, varnishes, etc.	1	8	8		7	7		1	1					
Plumbing, steam, and gas fitting	3	18	17	1	17	16	1	1	1					
Printing and binding	2	60	55	5	38	33	5	22	22					
Soap and borax	1	40	33	7	40	33	7							
Totals	32	489	429	60	462	402	60	27	27					
Wholesale and Retail—Stores and Offices.														
Butcher shops and markets	8	46	42	4	45	41	4	1	1					
Clothing and furnishings, retail	1	5	4	1	2	1	1	3	1		2			
Drug stores	2	9	9		5	5		4	4					
Dry goods, retail	4	26	7	19	22	3	19	4	2		2			
Furniture, retail	1	6	6		6	6								
Groceries, retail	5	21	18	3	21	18	3							
Liquors, wholesale	3	20	19	1	20	19	1							
Milk depots	2	17	15	2	17	15	2							
Paints, oils, varnishes, etc.	2	16	14	2	16	14	2							

Teaming, livery, and storage	3	17	15	2	17	15	2						
Miscellaneous	4	11	11		11	11							
Totals	35	194	160	34	182	148	34	12	8	4			
Recapitulation.													
Factories	32	489	429	60	462	402	60	27	27				
Stores and offices	35	194	160	34	182	148	34	12	8	4			
Grand totals	67	683	589	94	644	550	94	39	35	4			

TABLE XI. Inspection of Factories and Stores in PASADENA, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS. Total	ADULTS. Male	ADULTS. Female	MINORS. Total	MINORS. 16 to 18 years. Male	MINORS. 16 to 18 years. Female	MINORS. 14 to 16 years. Male	MINORS. 14 to 16 years. Female	MINORS. 12 to 14 years. Male	MINORS. 12 to 14 years. Female
Manufacturing.														
Automobiles, repairing, etc.	6	74	71	3	74	71	3							
Awnings, tents, etc.	1	6	5	1	6	5	1							
Bakery products, restaurants, etc.	15	151	103	48	148	100	48	3	3					
Bar and store fixtures, billiards, etc.	1	10	10		10	10								
Blacksmithing and horseshoeing	1	11	11		10	10		1	1					
Brick and tile	1	34	33	1	25	24	1	9	9					
Canning	1	245	56	189	181	40	141	64	8	22	5	17	3	9
Carriages and wagons	1	14	14		14	14								
Clothing	5	42	24	18	42	24	18							
Confectionery	1	5	2	3	5	2	3							
Construction work, general contracting, etc.	4	39	39		38	38		1	1					
Electrical goods and supplies	4	26	24	2	26	24	2							
Fixtures, gas and electric	1	9	9		9	9								
Flouring mill products	1	10	10		10	10								
Foundry and machine shop products	3	67	66	1	67	66	1							
Furniture	4	38	37	1	38	37	1							
Glass and glassware	1	8	7	1	7	6	1	1	1					
Ice	1	65	63	2	65	63	2							
Laundries, steam	3	193	93	100	178	84	94	15	9	6				
Lumber and milling	6	93	91	2	93	91	2							
Millinery	6	47		47	35		35	12		12				
Plumbing, steam, and gas fitting	5	94	91	3	87	84	3	7	5		2			
Printing and binding	5	63	48	15	60	45	15	3	3					
Stone and marble	1	9	9		9	9								
Tinware, sheet metal, etc.	1	10	10		9	9		1	1					
Miscellaneous	1	5	4	1	3	2	1	2	1		1			
Totals	80	1368	930	438	1249	877	372	119	42	40	8	17	3	9

Wholesale and Retail—Stores and Offices.														
Boots and shoes, retail	2	16	14	2	15	13	2	1	1					
Butcher shops and markets	4	34	29	5	25	20	5	9	9					
Clothing and furnishings, retail	4	24	21	3	22	19	3	2	1		1			
Department stores	2	18	4	14	14	4	10	4		3		1		
Dry goods, retail	6	95	37	58	88	30	58	7	6		1			
Drug stores	3	17	16	1	13	12	1	4	3		1			
Feed and fuel	3	16	15	1	16	15	1							
Furniture, retail	3	40	36	4	40	36	4							
Groceries, retail	7	211	183	28	195	167	28	16	10		6			
Hardware, retail	4	38	35	3	38	35	3							
Jewelry, retail	2	16	13	3	15	12	3	1	1					
Music, musical instruments, etc.	1	5	4	1	4	3	1	1	1					
Paints, oils, wall paper, etc., retail	1	7	7		7	7								
Stationery, retail	2	13	8	5	11	6	5	2	1		1			
Teaming, livery, and storage	3	42	42		42	42								
Miscellaneous	6	46	32	14	34	32	2	12		10		2		
Totals	53	638	496	142	579	453	126	59	33	13	10	3		
Recapitulation.														
Factories	80	1368	930	438	1249	877	372	119	42	40	8	17	3	9
Stores and offices	53	638	496	142	579	453	126	59	33	13	10	3		
Grand totals	133	2006	1426	580	1828	1330	498	178	75	53	18	20	3	9

TABLE XII. Inspection of Factories and Stores in SAN RAFAEL, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS. Total	ADULTS. Male	ADULTS. Female	MINORS. Total	MINORS. 16 to 18 years. Male	MINORS. 16 to 18 years. Female	MINORS. 14 to 16 years. Male	MINORS. 14 to 16 years. Female	MINORS. 12 to 14 years. Male	MINORS. 12 to 14 years. Female
Manufacturing.														
Automobiles, repairing, etc.	3	15	15		15	15								
Bakery products, restaurants, etc.	4	22	16	6	22	16	6							
Bar and store fixtures, billiards, etc.	1	4	4		4	4								
Blacksmithing and horseshoeing	3	10	10		10	10								
Carriages and wagons	4	20	20		20	20								
Clothing	1	9	7	2	9	7	2							
Construction work, general contracting, etc.	3	18	18		18	18								
Electrical goods and supplies	2	5	4	1	5	4	1							
Gloves	1	82	42	40	63	33	30	19	9	9		1		
Laundries, hand	5	62	35	27	62	35	27							
Laundries, steam	1	10	10		10	10								
Lumber and milling	3	37	36	1	37	36	1							
Plumbing, steam, and gas fitting	3	16	16		16	16								
Printing and binding	2	10	10		10	10								
Soda and mineral waters	1	5	5		5	5								
Tinware, sheet metal, etc.	1	5	5		5	5								
Miscellaneous	2	29	28	1	29	28	1							
Totals	40	359	281	78	340	272	68	19	9	9		1		
Wholesale and Retail—Stores and Offices.														
Butcher shops and markets	6	30	29	1	30	29	1							
Clothing and furnishings, retail	1	5	5		5	5								
Feed and fuel	3	15	15		15	15								
Groceries, retail	1	4	4		4	4								
Hardware, retail	2	11	11		11	11								
Milk depots	2	11	10	1	11	10	1							

Teaming, livery, and storage	5	22	22	-------	22	22	-------	-------	-------	-------	-------	-------	-------	-------
Miscellaneous	1	9	9	-------	9	9	-------	-------	-------	-------	-------	-------	-------	-------
Totals	21	107	105	2	107	105	2	-------	-------	-------	-------	-------	-------	-------
Recapitulation.														
Factories	40	359	281	78	340	272	68	19	9	9	-------	1	-------	-------
Stores and offices	21	107	105	2	107	105	2	-------	-------	-------	-------	-------	-------	-------
Totals	61	466	386	80	447	377	70	19	9	9	-------	1	-------	-------

TABLE XIII. Inspection of Factories and Stores in MISCELLANEOUS TOWNS of the State, 1909-10.
(Showing Number and Sex of Adult and Minor Employees, by Industries.)

INDUSTRY.	Number of establishments visited	Total number of employees	Total male	Total female	ADULTS.			MINORS.					
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.
									Male	Female	Male	Female	Male	Female
Manufacturing.														
Automobiles, repairing, etc.	17	89	88	1	86	85	1	3	3					
Bakery products, restaurants	27	192	145	47	188	143	45	4	2	2				
Blacksmithing and horseshoeing	21	107	107		105	105		2	2					
Boots and shoes	3	240	183	57	198	157	41	42	11	5	15	11		
Boxes, paper	2	36	9	27	36	9	27							
Boxes, wood	6	233	210	23	228	205	23	5	4		1			
Brick and tile	8	816	816		776	776		40	26		14			
Carriages and wagons	5	37	36	1	37	36	1							
Cleaning and dyeing	6	49	29	20	48	28	20	1			1			
Clothing	4	67	18	49	67	18	49							
Confectionery	1	12	9	3	10	7	3	2	2					
Construction work, general contracting, etc.	21	314	313	1	314	313	1							
Drugs and chemicals	6	249	248	1	249	248	1							
Electrical goods and supplies	4	24	24		24	24								
Flouring mill products	5	153	147	6	153	147	6							
Foundry and machine shop products	11	233	232	1	232	231	1	1	1					
Glass and glassware	1	4	4		4	4								
Gloves	4	226	100	126	193	85	108	33	9	15	6	3		
Hats, caps, and furnishings	3	249	28	221	241	28	213	8		8				
Ice	8	1188	1188		1188	1188								
Iron, structural and architectural	1	57	57		57	57								
Laundries, hand	19	189	96	93	188	95	93	1	1					
Laundries, steam	23	449	192	257	442	187	255	7	5	2				
Leather and leather goods	13	719	712	7	707	701	6	12	9	1	1		1	
Liquors, malt	9	90	88	2	90	88	2							
Lumber and milling	55	1812	1772	40	1800	1760	40	12	11		1			
Machinery	6	334	330	4	312	308	4	22	14		6		2	
Paints, varnishes, etc.	1	191	178	13	170	164	6	21	14	7				
Paper	3	302	302		297	297		5	5					
Pastes, macaroni, etc.	1	5	5		5	5								

Pickles, preserves, sauces, etc.	4	98	95	3	98	95	3							
Plumbing, steam, and gas fitting	13	81	80	1	81	80	1							
Printing and binding	15	274	181	93	247	163	84	27	16	9	2			
Rubber goods	1	127	117	10	105	96	9	22	20	1	1			
Shipwrights, calkers, etc.	3	181	181		168	168		13	13					
Slaughtering, meat packing, etc.	3	33	33		32	32		1	1					
Soap, tallow, glue, etc.	3	59	59		59	59								
Soda and mineral waters	2	11	11		11	11								
Stone and marble	17	97	97		97	97								
Tinware, sheet metal, etc.	3	25	25		25	25								
Miscellaneous	4	149	90	59	149	90	59							
Totals	362	9801	8635	1166	9517	8415	1102	284	169	50	48	14	3	
Wholesale and Retail—Stores and Offices.														
Boots and shoes, retail	1	6	6		5	5		1	1					
Butcher shops and markets	22	160	155	5	155	151	4	5	3	1	1			
Clothing and furnishings, retail	11	139	61	78	128	55	73	11	3	5	2		1	
Commission merchants	3	29	23	6	29	23	6							
Confectionery, retail	1	5	1	4	4	1	3	1		1				
Department stores	21	452	282	170	417	264	153	35	16	17	1		1	
Drug stores	11	49	44	5	45	40	5	4	3		1			
Dry goods, retail	22	309	117	192	293	104	189	16	6	3	6		1	
Feed and fuel	22	192	190	2	191	189	2	1	1					
Florists and nurseries	8	41	41		41	41								
Furniture, retail	8	57	52	5	57	52	5							
Groceries, retail	26	190	156	34	187	153	34	3	2		1			
Hardware, retail	10	69	65	4	67	63	4	2	2					
Household goods, crockery, glassware, etc., retail	1	4	4		4	4								
Liquors, wholesale	1	5	5		5	5								
Machinery and implements	2	29	29		29	29								
Meat, wholesale	1	27	25	2	25	23	2	2	2					
Milk depots	24	295	276	19	295	276	19							
Paints, oils, wall paper, etc., retail	2	10	9	1	10	9	1							
Teaming, livery, and storage	32	209	209		208	208		1	1					
Miscellaneous	8	65	55	10	65	55	10							
Totals	237	2342	1805	537	2260	1750	510	82	40	27	12		3	
Recapitulation.														
Factories	362	9801	8635	1166	9517	8415	1102	284	169	50	48	14	3	
Stores and offices	237	2342	1805	537	2260	1750	510	82	40	27	12		3	
Grand totals	599	12143	10440	1703	11777	10165	1612	366	209	77	60	14	6	

TABLE XIV. Inspection of Stores and Factories Summarized for the State, Fiscal Year 1909-10.

City.	Number of establishments visited	Total number of employees	Total male	Total female	Adults.			Minors.						
					Total	Male	Female	Total	16 to 18 years.		14 to 16 years.		12 to 14 years.	
									Male	Female	Male	Female	Male	Female
San Francisco	2960	64114	49652	14462	60531	47300	13231	3583	1857	915	487	316	8	-------
Los Angeles	1514	49378	38108	11270	46817	36514	10303	2561	1206	709	311	255	77	3
Oakland	600	13249	9739	3510	11859	9178	2681	1390	405	630	123	164	33	35
Sacramento	165	4955	3057	1898	4235	2709	1526	720	203	255	97	102	48	15
San Jose	210	4163	2638	1525	3694	2349	1345	469	177	122	60	58	52	-------
Stockton	112	2049	1654	395	1914	1578	336	135	63	45	11	11	2	3
San Diego	98	1803	1391	412	1710	1317	393	93	50	18	23	1	1	-------
Fresno	56	1091	855	236	990	792	198	101	26	36	37	2	-------	-------
Berkeley	72	1786	1419	367	1730	1390	340	56	24	22	4	5	1	-------
Alameda	67	683	589	94	644	550	94	39	35	-------	4	-------	-------	-------
Pasadena	133	2006	1426	580	1828	1330	498	178	75	53	18	20	3	9
San Rafael	61	466	386	80	447	377	70	19	9	9	-------	1	-------	-------
Miscellaneous towns	599	12143	10440	1703	11777	10165	1612	366	209	77	60	14	6	-------
Totals	6647	157886	121354	36532	148176	115549	32627	9710	4339	2891	1235	949	231	65

TABLE I. Sanitation and Ventilation of Stores and Factories in San Francisco.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	38	25	13		26	12	
Awnings, tents, etc.	5	4	1		4	1	
Bags, paper, and burlap	5	4	1		4	1	
Bakery products, restaurants, etc.	233	153	79	1	156	76	1
Bar and store fixtures, billiards, etc.	20	17	2	1	17	3	
Blacksmithing and horseshoeing	22	22			22		
Boilers, engines, and tanks	9	9			9		
Boots and shoes	8	7	1		7	1	
Boxes, paper	9	9			9		
Boxes, wood	4	4			4		
Brick and tile	3	3			3		
Canning	9	9			8	1	
Carriages and wagons	31	31			31		
Cigars and cigarettes	11	8	2	1	9	2	
Cleaning and dyeing	17	15	2		15	2	
Clothing	70	46	23	1	46	24	
Coffees, spices, etc.	10	10			10		
Coffins, etc.	2	2			2		
Confectionery	22	19	3		19	3	
Construction work, general contracting, etc.	57	54	3		55	2	
Cooperage	9	9			9		
Copper and brass goods	14	14			14		
Drugs and chemicals	9	9			9		
Electrical goods and supplies	25	24	1		24	1	
Elevators	6	6			6		
Extracts and perfumes	4	4			4		
Fixtures, gas and electric	6	6			6		
Flouring mill products	10	9	1		9	1	
Foundry and machine shop products	61	57		4	61		
Furniture	2	2			2		
Glass and glassware	8	7	1		8		
Gloves	6	5	1		5	1	
Harness and saddlery	10	10			10		
Hats, caps, and furnishings	25	21	4		21	4	
Ice	3	3			3		
Ink	3	3			3		
Iron, structural and architectural	33	30	1	2	32	1	
Jewelry and watches	7	6	1		6	1	
Laundries, hand	44	25	19		24	20	
Laundries, steam	29	24	5		24	5	
Leather and leather goods	21	21			21		
Liquors, malt	26	25	1		25	1	
Lithographing	15	15			15		
Lumber and milling	101	96	4	1	101		
Machinery	34	30	1	3	33	1	
Mattresses and pillows	11	10	1		10	1	
Millinery	21	14	7		14	7	
Moldings and frames	2	2			2		
Oils and grease	6	6			6		
Paints, varnishes, etc.	4	4			4		
Pastes, macaroni, etc.	6	6			6		
Patterns and models	5	5			5		
Photographs	3	3			3		
Pickles, preserves, sauces, etc.	8	7	1		8		
Plating	3	3			3		
Plumbing, steam, and gas fitting	26	26			26		
Printing and binding	99	95	3	1	97	2	
Roofing	7	7			7		
Rubber goods	3	3			3		

TABLE I. Sanitation and Ventilation of Stores and Factories in San Francisco—Cont.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.—Continued.							
Safes and vaults	3	3			3		
Shipwrights, calkers, etc.	16	14		2	16		
Slaughtering and meat packing	22	21	1		21	1	
Smelting	3	3			3		
Soap, tallow, glue, etc.	13	12		1	13		
Soda and mineral waters	6	6			6		
Stencils and stamps	3	3			3		
Stone and marble	23	23			23		
Stoves and furnaces	4	4			4		
Tinware, sheet metal, etc.	54	52	1	1	54		
Trunks, valises, etc.	3	3			3		
Miscellaneous	20	19		1	20		
Totals	1470	1266	184	20	1294	175	1
Wholesale.							
Boots and shoes	11	11			11		
Cigars and tobaccos	20	14	6		14	6	
Clothing and furnishings	21	17	4		17	4	
Commission merchants	91	88	3		88	3	
Drugs and chemicals	10	9	1		9	1	
Dry goods	14	7	7		7	7	
Furniture	9	9			9		
Gas and electric goods	14	14			14		
Groceries	42	36	6		37	5	
Hardware	35	34		1	35		
Household goods	7	6	1		5	2	
Importers	9	9			9		
Junk	7	7			7		
Leather	6	6			6		
Liquors	81	77	4		77	4	
Machinery and implements	19	19			19		
Meat	4	3	1		3	1	
Millinery	3	3			3		
Paints, oils, wall paper, etc.	12	10	2		10	2	
Paper	7	6	1		6	1	
Rubber goods	15	15			15		
Stationery	2	2			2		
Miscellaneous	73	68	5		67	6	
Totals	512	470	41	1	470	42	
Retail.							
Boots and shoes	16	12	4		12	4	
Butcher shops and markets	104	59	45		59	45	
Clothing and furnishings	70	47	23		47	23	
Confectionery	5	5			5		
Department stores	10	10			10		
Dry goods	28	21	7		21	7	
Drug stores	50	31	19		31	19	
Florists and nurseries	15	13	2		15		
Furniture	25	21	4		21	4	
Groceries	62	28	34		28	34	
Hardware	37	24	12	1	25	12	
Household goods, crockery, glassware, etc.	9	5	4		5	4	
Jewelry	3	3			3		
Leather goods	7	4	3		4	3	
Music, musical instruments, etc.	9	6	3		6	3	
Stationery	18	9	9		9	9	
Miscellaneous	44	36	8		36	8	
Totals	512	334	177	1	337	175	

TABLE I. Sanitation and Ventilation of Stores and Factories in San Francisco—Cont.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Miscellaneous.							
Banks	12	12			12		
Feed and fuel	48	44	3	1	45	3	
Lumber and shipping	28	28			28		
Milk depots	21	18	3		18	3	
Offices	177	173	4		173	4	
Teaming, livery, and storage	138	108	29	1	108	29	1
General	42	34	6	2	35	7	
Totals	466	417	45	4	419	46	1
Recapitulation.							
Manufacturing	1470	1266	184	20	1294	175	1
Wholesale	512	470	41	1	470	42	
Retail	512	334	177	1	337	175	
Miscellaneous	466	417	45	4	419	46	1
Grand totals	2960	2487	447	26	2520	438	2

TABLE II. Sanitation and Ventilation of Stores and Factories in Los Angeles.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	71	62	9		71		
Awnings, tents, etc.	4	4			4		
Bakery products, restaurants, etc.	158	147	11		152	6	
Bar and store fixtures, billiards, etc	11	11			11		
Boilers, engines, and tanks	3	3			3		
Boots and shoes	5	2	3		5		
Boxes, paper	3	3			3		
Boxes, wood	2	1	1		2		
Brick and tile	14	10	3	1	10	3	1
Brooms and brushes	3	2	1		3		
Canning	7	7			7		
Carriages and wagons	13	10	3		11	2	
Cigars and cigarettes	3	3			3		
Cleaning and dyeing	16	12	4		15	1	
Clothing	90	85	5		89	1	
Confectionery	25	24	1		25		
Construction work, general contracting, etc.	36	30	6		35	1	
Cooperage	2	2			2		
Copper and brass goods	4	4			4		
Drugs and chemicals	3	3			3		
Electric goods and supplies	14	12	2		14		
Fixtures, gas and electric	14	11	3		13	1	
Flouring mill products	8	8			8		
Foundry and machine shop products	37	33	4		35	2	
Furniture	11	11			11		
Glass and glassware	7	6	1		7		
Harness and saddlery	5	2	3		4	1	
Hats, caps, and furnishings	13	13			13		
Ice	5	5			5		
Iron, structural and architectural	5	5			5		
Jewelry and watches	20	19	1		20		
Laundries, hand	4	4			4		
Laundries, steam	22	14	8		13	8	1
Leather and leather goods	3	3			3		
Liquors, malt	8	8			8		
Lithographing	9	8	1		9		
Lumber and milling	55	50	5		54	1	
Machinery	22	19	3		21	1	
Mattresses and pillows	3	3			3		
Millinery	26	26			26		
Moldings	5	5			5		
Oil and grease	5	3	2		5		
Paints and varnishes	2	2			2		
Photographs	4	4			4		
Pickles, preserves, sauces, etc.	7	4	2	1	6	1	
Plating	2	1	1		2		
Plumbing, steam, and gas fitting	19	17	2		19		
Printing and binding	58	34	24		57	1	
Rubber goods	8	6	1	1	7		1
Slaughtering and meat packing	11	9	2		10	1	
Soda and mineral waters	3	3			3		
Stencils and stamps	3	3			3		
Stone and marble	13	11	2		13		
Tinware, sheet metal, etc.	22	21	1		22		
Trunks, valises, etc.	8	8			8		
Miscellaneous	26	21	5		25	1	
Totals	960	837	120	3	925	32	3

TABLE II. Sanitation and Ventilation of Stores and Factories in Los Angeles—Cont.

Industry.	Number of establishments visited	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Wholesale.							
Boots and shoes	4	4			3	1	
Cigars and Tobaccos	11	11			11		
Clothing and furnishings	7	7			7		
Commission merchants	12	11	1		12		
Drugs and chemicals	7	7			7		
Dry goods	2	2			2		
Furniture	3	3			3		
Gas and electric goods	5	5			5		
Groceries	32	31	1		31	1	
Hardware	24	23	1		23	1	
Jewelers	3	3			3		
Junk	3		2	1		2	1
Liquors	5	4	1		4	1	
Machinery and implements	22	22			22		
Paints, oils, wall paper, etc.	11	7	4		11		
Paper	4	4			4		
Rubber goods	7	7			7		
Stationery	3	2	1		2	1	
Miscellaneous	36	33	3		35	1	
Totals	201	186	14	1	192	8	1
Retail.							
Boots and shoes	23	23			23		
Butcher shops and markets	15	14	1		14	1	
Clothing and furnishings	41	40	1		41		
Department stores	8	8			8		
Dry goods	8	8			8		
Drug stores	18	18			18		
Florists and nurseries	11	7	4		11		
Furniture	28	26	2		28		
Groceries	22	21	1		22		
Hardware	13	13			13		
Household goods, crockery, glassware, etc.	4	4			4		
Music, musical instruments, etc.	10	10			10		
Paints, oils, wall paper, etc.	6	5	1		6		
Stationery	12	11	1		11	1	
Miscellaneous	25	23	2		24	1	
Totals	244	231	13		241	3	
Miscellaneous.							
Feed and fuel	11	10		1	11		
Milk depots	5	5			5		
Teaming, livery, and storage	31	23	7	1	31		
General	62	61	1		62		
Totals	109	99	8	2	109		
Recapitulation.							
Manufacturing	960	837	120	3	925	32	3
Wholesale	201	186	14	1	192	8	1
Retail	244	231	13		241	3	
Miscellaneous	109	99	8	2	109		
Grand totals	1514	1353	155	6	1467	43	4

TABLE III. Sanitation and Ventilation of Stores and Factories in Oakland.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	20	20			20		
Awning, tents, etc.	2	2			2		
Bakery products, restaurants, etc.	56	49	7		49	7	
Bar and store fixtures, billiards, etc.	4	4			4		
Boxes, wood	2	1	1		1	1	
Brick and tile	5	4	1		4	1	
Canning	3	3			3		
Carriages and wagons	5	4	1		4	1	
Cleaning and dyeing	4	4			4		
Clothing	10	10			10		
Confectionery	7	7			7		
Construction work, general contracting, etc.	13	13			13		
Copper and brass goods	2	1	1		1	1	
Drugs and chemicals	2	2			2		
Electrical goods and supplies	5	5			5		
Fixtures, gas and electric	3	3			3		
Flouring mill products, etc.	2	1	1		1	1	
Foundry and machine shop products	10	5	5		5	5	
Glass and glassware	3	3			3		
Gloves	3	3			3		
Harness and saddlery	3	3			3		
Hats, caps, and furnishings	2	2			2		
Iron, structural and architectural	3	3			3		
Jewelry and watches	7	7			7		
Laundries, hand	5	4	1		4	1	
Laundries, steam	11	11			11		
Liquors, malt	6	6			6		
Lithographing	2	2			2		
Lumber and milling	32	25	5	2	27	5	
Machinery	4	3	1		3	1	
Millinery	15	15			15		
Paints, varnishes, etc.	3	3			3		
Pastes, macaroni, etc.	2	1	1		1	1	
Pickles, preserves, sauces, etc.	4	4			4		
Plumbing, steam, and gas fitting	3	3			3		
Printing and binding	14	13	1		13	1	
Rubber goods	2	2			2		
Soda and mineral waters	2	2			2		
Tinware, sheet metal, etc.	3	2	1		2	1	
Miscellaneous	16	15	1		15	1	
Totals	300	270	28	2	272	28	
Wholesale.							
Commission merchants	20	18	2		19	1	
Drugs and chemicals	2	2			2		
Furniture	2	2			2		
Groceries	10	10			10		
Hardware	7	6	1		6	1	
Junk	4	2	2		2	2	
Liquors	5	5			5		
Machinery and implements	3	3			3		
Paints, oils, wall paper, etc.	3	2	1		2	1	
Miscellaneous	11	9	2		9	2	
Totals	67	59	8		60	7	

TABLE III. Sanitation and Ventilation of Stores and Factories in Oakland—Cont.

Industry.	Number of establishments visited	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Retail.							
Boots and shoes	9	8	1	------	8	1	------
Butcher shops and markets	25	23	2	------	23	2	------
Clothing and furnishings	25	25	------	------	25	------	------
Department stores	2	2	------	------	2	------	------
Dry goods	5	5	------	------	5	------	------
Drug stores	8	8	------	------	8	------	------
Florists and nurseries	5	5	------	------	5	------	------
Furniture	16	16	------	------	16	------	------
Groceries	20	20	------	------	20	------	------
Hardware	9	9	------	------	9	------	------
Household goods, crockery, glassware, etc.	4	4	------	------	4	------	------
Jewelry	3	3	------	------	3	------	------
Music, musical instruments, etc.	9	8	1	------	9	------	------
Paints, oils, wall paper, etc.	3	3	------	------	3	------	------
Stationery	6	6	------	------	6	------	------
Miscellaneous	17	17	------	------	17	------	------
Totals	166	162	4	------	163	3	------
Miscellaneous.							
Feed and fuel	20	15	5	------	15	5	------
Milk depots	7	7	------	------	7	------	------
Teaming, livery, and storage	36	29	7	------	30	6	------
General	4	4	------	------	4	------	------
Totals	67	55	12	------	56	11	------
Recapitulation.							
Manufacturing	300	270	28	2	272	28	------
Wholesale	67	59	8	------	60	7	------
Retail	166	162	4	------	163	3	------
Miscellaneous	67	55	12	------	56	11	------
Totals	600	546	52	2	551	49	------

TABLE IV. Sanitation and Ventilation of Stores and Factories in Sacramento.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Bakery products, restaurants, etc.	12	6	6		12		
Canning	4	4			4		
Carriages and wagons	4	4			4		
Cigars and cigarettes	3	3			2	1	
Clothing	4	4			4		
Confectionery	3	3			3		
Construction work, general contracting, etc.	2	2			2		
Drugs and chemicals	2	2			2		
Foundry and machine shop products	3	3			3		
Furniture	2	2			2		
Harness and saddlery	2	2			2		
Liquors, malt	2	2			2		
Lumber and milling	3	3			3		
Plumbing, steam, and gas fitting	3	3			3		
Printing and binding	8	7	1		8		
Slaughtering and meat packing	3	3			3		
Soda and mineral waters	2	2			2		
Tinware, sheet metal, etc.	2	2			2		
Miscellaneous	7	7			7		
Totals	71	64	7		70	1	
Wholesale.							
Commission merchants	4	4			4		
Groceries	4	4			4		
Hardware	4	4			4		
Liquors	6	6			6		
Machinery and implements	2	2			2		
Miscellaneous	4	3		1	4		
Totals	24	23		1	24		
Retail.							
Boots and shoes	2	2			2		
Butcher shops and markets	3	3			3		
Clothing and furnishings	3	3			3		
Department stores	4	4			4		
Dry goods	2	2			2		
Drug stores	19	19			19		
Furniture	5	5			5		
Groceries	7	6		1	7		
Hardware	2	1	1		1	1	
Jewelry	3	3			3		
Miscellaneous	11	11			11		
Totals	61	59	1	1	60	1	
Miscellaneous.							
Milk depots	2	2			2		
Teaming, livery and storage	7	7			7		
Totals	9	9			9		
Recapitulation.							
Manufacturing	71	64	7		70	1	
Wholesale	24	23		1	24		
Retail	61	59	1	1	60	1	
Miscellaneous	9	9			9		
Grand totals	165	155	8	2	163	2	

TABLE V. Sanitation and Ventilation of Stores and Factories in San Jose.

Industry.	Number of establishments visited	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	7	7			7		
Bakery products, restaurants, etc.	28	27	1		28		
Brick and tile	2	2			2		
Canning	4	4			4		
Carriages and wagons	5	5			5		
Cigars and cigarettes	3	3			3		
Cleaning and dyeing	3	3			3		
Confectionery	4	4			4		
Electrical goods and supplies	2	2			2		
Foundry and machine shop products	2	2			2		
Gloves	2	2			2		
Laundries, hand	2	2			2		
Laundries, steam	5	5			5		
Liquors, malt	3	3			3		
Lumber and milling	5	5			5		
Machinery	3	3			3		
Millinery	5	5			5		
Pastes, macaroni, etc.	2	1	1		2		
Plumbing, steam, and gas fitting	4	4			4		
Printing and binding	9	9			9		
Soda and mineral waters	2	2			2		
Miscellaneous	9	8	1		9		
Totals	111	108	3		111		
Wholesale.							
Commission merchants	2	2			2		
Groceries	4	4			4		
Machinery and implements	4	4			4		
Miscellaneous	6	6			6		
Totals	16	16			16		
Retail.							
Boots and shoes	4	4			4		
Butcher shops and markets	8	8			8		
Clothing and furnishings	14	14			14		
Department stores	3	3			3		
Dry goods	3	3			3		
Furniture	4	4			4		
Groceries	10	10			10		
Hardware	2	2			2		
Music, musical instruments, etc.	2	2			2		
Paints, oils, wall paper, etc.	2	2			2		
Miscellaneous	10	10			10		
Totals	62	62			62		
Miscellaneous.							
Banks	6	6			6		
Feed and fuel	5	5			5		
Teaming, livery, and storage	10	10			10		
Totals	21	21			21		
Recapitulation.							
Manufacturing	111	108	3		111		
Wholesale	16	16			16		
Retail	62	62			62		
Miscellaneous	21	21			21		
Grand totals	210	207	3		210		

TABLE VI. Sanitation and Ventilation of Stores and Factories in Stockton.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Bakery products, restaurants, etc.	10	3	7		5	5	
Clothing	4	4			4		
Flouring mill products	4		4		4		
Foundry and machine shop products	4	4			4		
Harness and saddlery	2	1	1		1	1	
Laundries, steam	4	4			1	3	
Lumber and milling	5	5			5		
Machinery	5	5			5		
Millinery	2	1	1		2		
Plumbing, steam, and gas fitting	2	2			2		
Miscellaneous	6	4	2		5	1	
Totals	48	33	15		38	10	
Wholesale.							
Miscellaneous	6	6			6		
Totals	6	6			6		
Retail.							
Boots and shoes	6	6			6		
Butcher shops and markets	3	2	1		2	1	
Clothing and furnishings	6	2	4		6		
Department stores	2	2			2		
Dry goods	4	1	3		3	1	
Drug stores	14	11	3		13	1	
Furniture	3	2	1		3		
Hardware	4		4		4		
Paints, oils, wall paper, etc.	3	3			3		
Miscellaneous	3	2	1		3		
Totals	48	31	17		45	3	
Miscellaneous.							
Feed and fuel	2	2			2		
Teaming, livery, and storage	5	5			5		
General	3	2	1		3		
Totals	10	9	1		10		
Recapitulation.							
Manufacturing	48	33	15		38	10	
Wholesale	6	6			6		
Retail	48	31	17		45	3	
Miscellaneous	10	9	1		10		
Grand totals	112	79	33		99	13	

TABLE VII. Sanitation and Ventilation of Stores and Factories in San Diego.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Bakery products, restaurants, etc.	12	10	2		7	5	
Cleaning and dyeing	2	1		1	1	1	
Confectionery	3	3			3		
Electrical goods and supplies	2	1	1		1	1	
Foundry and machine shop products	2	1	1		1		1
Laundries, steam	3	2	1		2	1	
Lumber and milling	3	3			2	1	
Plumbing, steam, and gas fitting	2	1	1		1	1	
Stone and marble	2	2			2		
Tinware, sheet metal, etc.	3	3			3		
Miscellaneous	15	15			14	1	
Totals	49	42	6	1	37	11	1
Wholesale.							
Commission merchants	3	3			3		
Groceries	3	3			3		
Miscellaneous	3	2		1	2		1
Totals	9	8		1	8		1
Retail.							
Clothing and furnishings	5	4	1		4	1	
Department stores	2	2			2		
Dry goods	4	1	2	1	2		2
Drug stores	5	4	1		5		
Furniture	3	3			3		
Groceries	3	3			3		
Hardware	3	3			3		
Household goods, crockery, glassware, etc.	3	2	1		3		
Music, musical instruments, etc.	2	2			2		
Stationery	2	2			2		
Miscellaneous	8	7	1		7	1	
Totals	40	33	6	1	36	2	2
Recapitulation.							
Manufacturing	49	42	6	1	37	11	1
Wholesale	9	8		1	8		1
Retail	40	33	6	1	36	2	2
Grand totals	98	83	12	3	81	13	4

TABLE VIII. Sanitation and Ventilation of Stores and Factories in Fresno.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	1	1			1		
Bakery products, restaurants, etc.	3	2	1		3		
Confectionery	1	1			1		
Electrical goods and supplies	1	1			1		
Flouring mill products	1	1			1		
Foundry and machine shop products	1	1			1		
Harness and saddlery	2	2			2		
Laundries, steam	2	1	1		1	1	
Liquors, malt	1	1			1		
Lumber and milling	6	2	4		6		
Machinery and implements	2	1	1		2		
Plumbing, steam, and gas fitting	2	2			2		
Printing and binding	3	2		1	3		
Slaughtering and meat packing	2	2			2		
Soda and mineral water	1		1			1	
Totals	29	20	8	1	27	2	
Wholesale and Retail.—Stores and Offices.							
Clothing and furnishings, retail	8	1	7		8		
Commission merchants	1	1			1		
Department stores	4	1	3		4		
Drug stores	2	2			2		
Feed and fuel	1	1				1	
Furniture, retail	2	1	1		2		
Groceries, retail	1		1		1		
Hardware, retail	2	1	1		2		
Liquors, wholesale	1	1			1		
Milk depots	1	1			1		
Teaming, livery, and storage	3		3		1	2	
Miscellaneous	1		1		1		
Totals	27	10	17		24	3	
Recapitulation.							
Factories	29	20	8	1	27	2	
Stores and offices	27	10	17		24	3	
Grand totals	56	30	25	1	51	5	

TABLE IX. Sanitation and Ventilation of Stores and Factories in Berkeley.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	2	2			2		
Bakery products, restaurants, etc.	2	2			2		
Blacksmithing and horseshoeing	2	2			2		
Boilers, engines, and tanks	1	1			1		
Canning	1	1			1		
Cleaning and dyeing	1	1			1		
Confectionery	1	1			1		
Construction work, general contracting, etc.	2	2			2		
Drugs and chemicals	2	2			2		
Elevators	1	1			1		
Flouring mill products	1	1			1		
Foundry and machine shop products	1	1			1		
Hats, caps, and furnishings	1	1			1		
Ink	1	1			1		
Iron, structural and architectural	1	1			1		
Laundries, hand	1	1			1		
Laundries, steam	2	2			2		
Leather and leather goods	1	1			1		
Liquors, malt	1	1			1		
Lumber and milling	10	10			10		
Machinery	2	2			2		
Mattresses and pillows	1	1			1		
Oils and grease	2	2			2		
Plumbing, steam, and gas fitting	2	2			2		
Printing and binding	4	4			4		
Slaughtering and meat packing	6	6			6		
Soap, tallow, glue, etc.	2	2			2		
Miscellaneous	5	4	1		4	1	
Totals	59	58	1		58	1	
Wholesale and Retail.—Stores and Offices.							
Clothing and furnishings, retail	1	1			1		
Dry goods, retail	3	3			3		
Feed and fuel	1	1			1		
Groceries, retail	1	1			1		
Teaming, livery, and storage	7	6	1		7		
Totals	13	12	1		13		
Recapitulation.							
Factories	59	58	1		58	1	
Stores and offices	13	12	1		13		
Grand totals	72	70	2		71	1	

TABLE X. Sanitation and Ventilation of Stores and Factories in Alameda.

Industry.	Number of establishments visited	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	1	1			1		
Bakery products, restaurants, etc.	8	8			8		
Brick and tile	2	2			2		
Cleaning and dyeing	1	1			1		
Clothing	1	1			1		
Confectionery	2	2			2		
Construction work, general contracting, etc.	4	3	1		4		
Jewelry and watches	1	1			1		
Laundries	2	2			2		
Lumber and milling	2	2			2		
Machinery	1	1			1		
Paints, oils, varnishes, etc.	1	1			1		
Plumbing, steam, and gas fitting	3	3			3		
Printing and binding	2	2			2		
Soap and borax	1	1			1		
Totals	32	31	1		32		
Wholesale and Retail.—Stores and Offices.							
Butcher shops and markets	8	8			8		
Clothing and furnishings, retail	1	1			1		
Drug stores	2	2			2		
Dry goods, retail	4	4			4		
Furniture, retail	1	1			1		
Groceries, retail	5	4	1		4	1	
Liquors, wholesale	3	3			3		
Milk depots	2	2			2		
Paints, varnishes, etc.	2	2			2		
Teaming, livery, and storage	3	3			3		
Miscellaneous	4	4			4		
Totals	35	34	1		34	1	
Recapitulation.							
Factories	32	31	1		32		
Stores and offices	35	34	1		34	1	
Grand totals	67	65	2		66	1	

TABLE XI. Sanitation and Ventilation of Stores and Factories in Pasadena.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	6	------	6	------	6	------	------
Awnings, tents, etc.	1	------	1	------	1	------	------
Bakery products, restaurants, etc.	15	13	2	------	14	1	------
Bar and store fixtures, billiards, etc.	1	1	------	------	1	------	------
Blacksmithing and horseshoeing	1	------	1	------	1	------	------
Brick and tile	1	1	------	------	1	------	------
Canning	1	------	1	------	1	------	------
Carriages and wagons	1	------	1	------	1	------	------
Clothing	5	5	------	------	5	------	------
Confectionery	1	------	1	------	1	------	------
Construction work, general contracting, etc.	4	1	3	------	4	------	------
Electrical goods and supplies	4	3	1	------	4	------	------
Fixtures, gas and electric	1	1	------	------	1	------	------
Flouring mill products	1	------	1	------	1	------	------
Foundry and machine shop products	3	1	2	------	3	------	------
Furniture	4	1	3	------	4	------	------
Glass and glassware	1	1	------	------	1	------	------
Ice	1	1	------	------	1	------	------
Laundries, steam	3	2	1	------	3	------	------
Lumber and milling	6	6	------	------	6	------	------
Millinery	6	6	------	------	6	------	------
Plumbing, steam, and gas fitting	5	5	------	------	5	------	------
Printing and binding	5	4	1	------	5	------	------
Stone and marble	1	------	1	------	1	------	------
Tinware, sheet metal, etc.	1	------	1	------	1	------	------
Miscellaneous	1	------	1	------	1	------	------
Totals	80	52	28	------	79	1	------
Wholesale and Retail.—Stores and Factories.							
Boots and shoes, retail	2	2	------	------	2	------	------
Butcher shops and markets	4	3	1	------	4	------	------
Clothing and furnishings, retail	4	4	------	------	4	------	------
Department stores	2	2	------	------	2	------	------
Dry goods, retail	6	6	------	------	6	------	------
Drug stores	3	3	------	------	3	------	------
Feed and fuel	3	1	2	------	3	------	------
Furniture, retail	3	3	------	------	3	------	------
Groceries, retail	7	7	------	------	7	------	------
Hardware, retail	4	4	------	------	4	------	------
Jewelry, retail	2	2	------	------	2	------	------
Music, musical instruments, etc.	1	1	------	------	1	------	------
Paints, oils, wall paper, etc., retail	1	1	------	------	1	------	------
Stationery, retail	2	2	------	------	2	------	------
Teaming, livery, and storage	3	1	2	------	3	------	------
Miscellaneous	6	5	1	------	6	------	------
Totals	53	47	6	------	53	------	------
Recapitulation.							
Factories	80	52	28	------	79	1	------
Stores and offices	53	47	6	------	53	------	------
Grand totals	133	99	34	------	132	1	------

TABLE XII. Sanitation and Ventilation of Stores and Factories in San Rafael.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	3	3			3		
Bakery products, restaurants, etc.	4	4			4		
Bar and store fixtures, billiards, etc.	1	1			1		
Blacksmithing and horseshoeing	3	3			3		
Carriages and wagons	4	4			4		
Clothing	1	1			1		
Construction work, general contracting, etc.	3	3			3		
Electrical goods and supplies	2	2			2		
Gloves	1	1			1		
Laundries, hand	5	5			5		
Laundries, steam	1	1			1		
Lumber and milling	3	3			3		
Plumbing, steam, and gas fitting	3	3			3		
Printing and binding	2	2			2		
Soda and mineral water	1	1			1		
Tinware, sheet metal, etc.	1	1			1		
Miscellaneous	2	2			2		
Totals	40	40			40		
Wholesale and Retail.—Stores and Offices.							
Butcher shops and markets	6	6			6		
Clothing and furnishings, retail	1	1			1		
Feed and fuel	3	3			3		
Groceries, retail	1	1			1		
Hardware, retail	2	2			2		
Milk depots	2	2			2		
Teaming, livery, and storage	5	5			5		
Miscellaneous	1	1			1		
Totals	21	21			21		
Recapitulation.							
Factories	40	40			40		
Stores and offices	21	21			21		
Grand totals	61	61			61		

TABLE XIII. Sanitation and Ventilation of Stores and Factories in Miscellaneous Towns of the State.

Industry.	Number of establishments visited	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Manufacturing.							
Automobiles, repairing, etc.	17	17			17		
Bakery products, restaurants, etc.	27	27			27		
Blacksmithing and horseshoeing	21	21			21		
Boots and shoes	3	3			3		
Boxes, paper	2	2			2		
Boxes, wood	6	6			6		
Brick and tile	8	8			8		
Carriages and wagons	5	5			5		
Cleaning and dyeing	6	6			6		
Clothing	4	4			4		
Confectionery	1	1			1		
Construction work, general contracting, etc.	21	21			21		
Drugs and chemicals	6	6			6		
Electrical goods and supplies	4	3		1	3		1
Flouring mill products	5	5			5		
Foundry and machine shop products	11	9	2		10	1	
Glass and glassware	1	1			1		
Gloves	4	4			4		
Hats, caps, and furnishings	3	3			3		
Ice	8	8			8		
Iron, structural and architectural	1	1			1		
Laundries, hand	19	18	1		19		
Laundries, steam	23	22		1	22		1
Leather and leather goods	13	12	1		13		
Liquors, malt	9	9			9		
Lumber and milling	55	52	3		55		
Machinery	6	6			6		
Paints, varnishes, etc.	1	1			1		
Paper	3	3			3		
Pastes, macaroni, etc.	1	1			1		
Pickles, preserves, sauces, etc.	4	4			4		
Plumbing, steam, and gas fitting	13	12	1		13		
Printing and binding	15	15			15		
Rubber goods	1	1			1		
Shipwrights, calkers, etc.	3	3			3		
Slaughtering, meat packing, etc.	3	3			3		
Soap, tallow, glue, etc.	3	3			2	1	
Soda and mineral waters	2	2			2		
Stone and marble	17	17			17		
Tinware, sheet metal, etc.	3	3			3		
Miscellaneous	4	4			4		
Totals	362	352	8	2	358	2	2

TABLE XIII. Sanitation and Ventilation of Stores and Factories in Miscellaneous Towns of the State—Continued.

Industry.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
Wholesale and Retail.—Stores and Offices.							
Boots and shoes, retail	1	1			1		
Butcher shops and markets	22	19	3		22		
Clothing and furnishings, retail	11	7	4		11		
Commission merchants	3	3			3		
Confectionery, retail	1	1			1		
Department stores	21	20	1		20	1	
Drug stores	11	10	1		11		
Dry goods, retail	22	22			22		
Feed and fuel	22	22			22		
Florists and nurseries	8	8			8		
Furniture, retail	8	7	1		8		
Groceries, retail	26	21	5		26		
Hardware, retail	10	10			10		
Household goods, crockery, glassware, etc., retail	1	1			1		
Liquors, wholesale	1	1			1		
Machinery and implements	2		2		2		
Meat, wholesale	1	1			1		
Milk depots	24	24			24		
Paints, oils, wall papers, etc., retail	2	2			2		
Teaming, livery, and storage	32	30	2		31	1	
Miscellaneous	8	8			8		
Totals	237	218	19		235	2	
Recapitulation.							
Factories	362	352	8	2	358	2	2
Stores and offices	237	218	19		235	2	
Grand totals	599	570	27	2	593	4	2

TABLE XIV. Sanitation and Ventilation of Stores and Factories, Summarized for the State, Fiscal Year 1909-10.

CITY.	Number of establishments visited.	Sanitation.			Ventilation.		
		Good	Fair	Bad	Good	Fair	Bad
San Francisco	2960	2487	447	26	2520	438	2
Los Angeles	1514	1353	155	6	1467	43	4
Oakland	600	546	52	2	551	49	
Sacramento	165	155	8	2	163	2	
San Jose	210	207	3		210		
Stockton	112	79	33		99	13	
San Diego	98	83	12	3	81	13	4
Fresno	56	30	25	1	51	5	
Berkeley	72	70	2		71	1	
Alameda	67	65	2		66	1	
Pasadena	133	99	34		132	1	
San Rafael	61	61			61		
Miscellaneous towns	599	570	27	2	593	4	2
Totals	6647	5805	800	42	6065	570	12

AGRICULTURE

TABLE I. Distribution of Farms Visited in Farm Labor Investigation.

Farms operated by whites—	
Employing white labor only	1,135
Employing white and Japanese labor	1,105
Employing other kinds of labor	129
Total white farms	2,369
Farms operated by Japanese—	
Operated by owners	132
Operated by cash lessees	1,170
Operated by share lessees	431
Total Japanese farms	1,733
Grand total of all farms visited	4,102

TABLE II. Distribution of Farms Operated by Whites Employing White Labor Only and Those Employing White and Japanese Labor, According to Size of Farm.

Size of farms.	Farms employing white labor only.		Farms employing white and Japanese labor.		Total farms.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Under 10 acres	50	4.4	17	1.5	67	3.0
10 to 19 acres	137	12.1	42	3.8	179	8.0
20 to 49 acres	376	33.1	236	21.4	612	27.3
50 to 99 acres	225	19.8	283	25.6	508	22.6
100 to 249 acres	202	17.8	261	23.6	463	20.7
250 to 499 acres	82	7.2	116	10.5	198	8.8
500 to 999 acres	35	3.1	85	7.7	120	5.4
1,000 acres and over	28	2.5	65	5.9	93	4.2
Totals	1,135	100.0	1,105	100.0	2,240	100.0

TABLE III. Distribution of Farms Operated by Japanese, Cash and Share Lessees, According to Size of Farms.

Size of farms.	Farms operated by cash lessees.		Farms operated by share lessees.		Total farms.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Under 5 acres	172	14.7	20	4.6	192	12.0
5 to 9 acres	223	19.1	30	7.0	253	15.7
10 to 19 acres	205	17.5	34	7.9	239	14.9
20 to 29 acres	157	13.4	53	12.3	210	13.1
30 to 39 acres	92	7.9	36	8.4	128	8.0
40 to 49 acres	84	7.2	48	11.2	132	8.3
50 to 75 acres	82	7.0	65	15.1	147	9.2
75 to 99 acres	46	3.9	26	6.0	72	4.5
100 to 199 acres	70	6.0	80	18.5	150	9.4
200 acres and over	39	3.3	39	9.0	78	4.9
Totals	1,170	100.0	431	100.0	1,601	100.0

TABLE IV. Distribution of Farms Operated by Whites Employing White Labor Only and Those Employing White and Japanese Labor, According to Principal Crop Grown.

Principal crops grown.	Employing white labor only.		Employing white and Japanese labor.		Total farms.	
	Total number visited.	Percentage containing less than 100 acres.	Total number visited.	Percentage containing less than 100 acres.	Total number visited.	Percentage containing less than 100 acres.
Berries			36	91.7	36	91.7
Citrus fruits	34	73.5	58	60.3	92	65.2
Deciduous fruits	271	90.7	382	56.8	653	70.9
Grapes	287	89.5	235	57.0	522	74.9
Hay and grain	262	30.9	18	11.1	280	29.6
Hops	38	92.1	38	71.0	76	81.7
Miscellaneous	71	47.9	47	10.6	118	33.0
Nursery products			23	34.8	23	34.8
Sugar beets	5	40.0	100	36.0	105	36.2
Vegetables	167	64.7	168	48.2	335	56.4
Totals	1,135	69.4	1,105	52.3	2,240	60.9

TABLE V. Number, Acreage, and Value of Crops Grown on Farms Visited.

Principal crops.	Total for all farms.			Farms of white farmers employing white labor only.			Farms of white farmers employing white and Japanese labor.			Farms of Japanese farmers.		
	Number of farms.	Acreage	Value of crop	Number of farms.	Acreage	Value of crop	Number of farms.	Acreage	Value of crop	Number of farms.	Acreage	Value of crop
Berries	491	6,044	$883,431	------	--------	----------	36	1,457	$153,700	455	4,587	$729,731
Citrus fruit	94	12,705	2,547,710	34	2,456	$510,760	58	10,229	2,034,950	2	20	2,000
Deciduous fruit	1,057	100,235	6,169,625	271	12,649	779,497	382	64,467	3,638,918	404	23,119	1,751,210
Grapes	676	86,857	3,148,683	287	16,323	500,213	235	60,877	2,213,120	154	9,657	435,350
Hay and grain	294	118,174	1,945,307	262	96,938	1,670,282	18	20,326	246,495	14	910	28,530
Hops	78	7,083	1,252,541	38	1,908	318,281	38	4,902	888,260	2	273	46,000
Nursery products	87	8,090	1,350,920	------	--------	----------	23	7,438	1,144,150	64	652	206,770
Sugar beets	137	69,136	2,844,104	5	2,524	134,700	100	60,959	2,438,354	32	5,653	271,050
Vegetables	866	100,861	6,550,851	167	22,106	1,191,854	168	45,288	2,841,837	531	33,467	2,517,160
Miscellaneous	190	153,788	2,457,536	71	30,492	656,153	47	118,382	1,553,328	72	4,914	248,055
Totals	3,970	662,973	$29,150,708	1,135	185,396	$5,761,740	1,105	394,325	$17,153,112	1,730	83,252	$6,235,856

TABLE VI. Race of Labor Employed by White Farmers. (Showing Number and Sex, by Counties.)

Counties.	Number of farms.	Total acreage.	Races.															
			Totals.		Whites.		Japanese.		Chinese.		Mexicans.		Hindus.		Indians.		All others.	
			Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Alameda	43	9807	1299	137	598	130	655	7	46									
Alpine																		
Amador																		
Butte	62	13057	1366	526	1238	526	24		5				87		12			
Calaveras																		
Colusa																		
Contra Costa	146	34379	1799	63	1031	61	672	2	39				57					
Del Norte																		
El Dorado																		
Fresno	153	34557	7224	522	1488	522	4912		354		101		97		232		40	
Glenn																		
Humboldt																		
Imperial	96	21595	584	27	476	27	81				17				10			
Inyo																		
Kern	1	640	123		13		50		60									
Kings	24	5531	1410	160	397	160	852		102		30		19				10	
Lake																		
Lassen																		
Los Angeles	45	25924	1197	86	381	81	558	5			257						1	
Madera																		
Marin																		
Mariposa																		
Mendocino	32	1426	1981	932	1594	679	68	1	2						317	252		
Merced																		
Modoc																		
Mono																		
Monterey	72	34865	1809	9	481	1	1317	8	11									
Napa	198	17321	1534	230	1247	226	205	4	82									
Nevada																		
Orange	58	10644	1074	34	333	32	682	2	7		49						3	
Placer	8	558	74	8	47	8	16						11					
Plumas																		
Riverside	23	11071	264	30	179	30	61				24							

Sacramento	57	18718	1989	60	788	38	628	22	473				100					
San Benito	23	3355	427	33	106	33	321											
San Bernardino	21	7067	850	30	270	30	175		32		368						5	
San Diego																		
San Francisco																		
San Joaquin	113	31054	2279	278	941	278	1312		7				19					
San Luis Obispo	4	3073	65		15		50											
San Mateo																		
Santa Barbara	164	67444	1651		854		781		16									
Santa Clara	159	16969	3214	562	1399	556	1512	6	303									
Santa Cruz	45	5400	764	66	171		544	66	49									
Shasta	26	16730	401	73	165		57		6						173	73		
Sierra																		
Siskiyou																		
Solano	79	9912	2736	653	964	653	1215		324		27		198				8	
Sonoma	337	18461	6265	2172	5165	2019	857	58	1				9		233	95		
Stanislaus																		
Sutter	6	2187	527	40	401	40	114						12					
Tehama	29	84210	971	97	555	97	215		108				93					
Trinity																		
Tulare	58	19077	3333	246	1206	246	1702		12		351		15		32		15	
Tuolumne																		
Ventura	240	76598	5146	854	1960	644	2530		15		623	210	18					
Yolo	44	11173	974	132	455	132	470		7				38		4			
Yuba	3	1029	1133	675	908	675	175		30						20			
Totals	2369	613852	54463	8735	25826	7924	22811	181	2091		1847	210	773		1033	420	82	

TABLE VII. Race of Labor Employed by White Farmers. (Showing Number and Sex, by Principal Crops Grown.)

Principal crop.	Number of farms.	Total acreage.	Races.															
			Totals.		Whites.		Japanese.		Chinese.		Mexicans.		Hindus.		Indians.		All others.	
			Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Berries	36	1457	544	75	18	------	465	75	48	------	13	------	------	------	------	------	------	------
Citrus fruits	98	13025	2642	212	1186	201	1088	1	21	------	281	10	59	------	------	------	7	------
Deciduous fruits	691	83118	14625	3742	6630	3479	6664	36	654	------	253	200	313	------	93	27	18	------
Grapes	557	81729	12345	489	4488	448	6627	12	591	------	160	------	102	------	322	29	55	------
Hay and grain	286	122598	2126	54	1942	54	144	------	20	------	8	------	10	------	------	------	------	------
Hops	96	7777	8011	3549	6417	3251	950	50	189	------	------	------	29	------	426	248	------	------
Miscellaneous	136	163609	3428	449	1980	331	758	2	106	------	392	------	------	------	192	116	------	------
Nursery products	23	7438	1477	4	365	4	848	------	247	------	------	------	17	------	------	------	------	------
Sugar beets	105	63483	4663	2	991	------	3092	2	19	------	508	------	53	------	------	------	------	------
Vegetables	341	69618	4602	159	1809	156	2175	3	196	------	232	------	190	------	------	------	------	------
Totals	2369	613852	54463	8735	25826	7924	22811	181	2091	------	1847	210	773	------	1033	420	82	------

CHART I.

Race of Farm Labor Employed, According to Principal Crop Grown.

In this chart there is presented the percentage of farm labor of different races employed, according to the principal crop grown. These percentages are based on a record of 2,369 farms operated by white farmers. These farms were located in practically all the important agricultural and horticultural sections of the State. They contained 613,852 acres, on which were raised crops to the value of $23,000,000. On these farms there were employed during the year a total of 63,198 persons. The chart shows at a glance the crops which are dependent upon either white or Japanese labor.

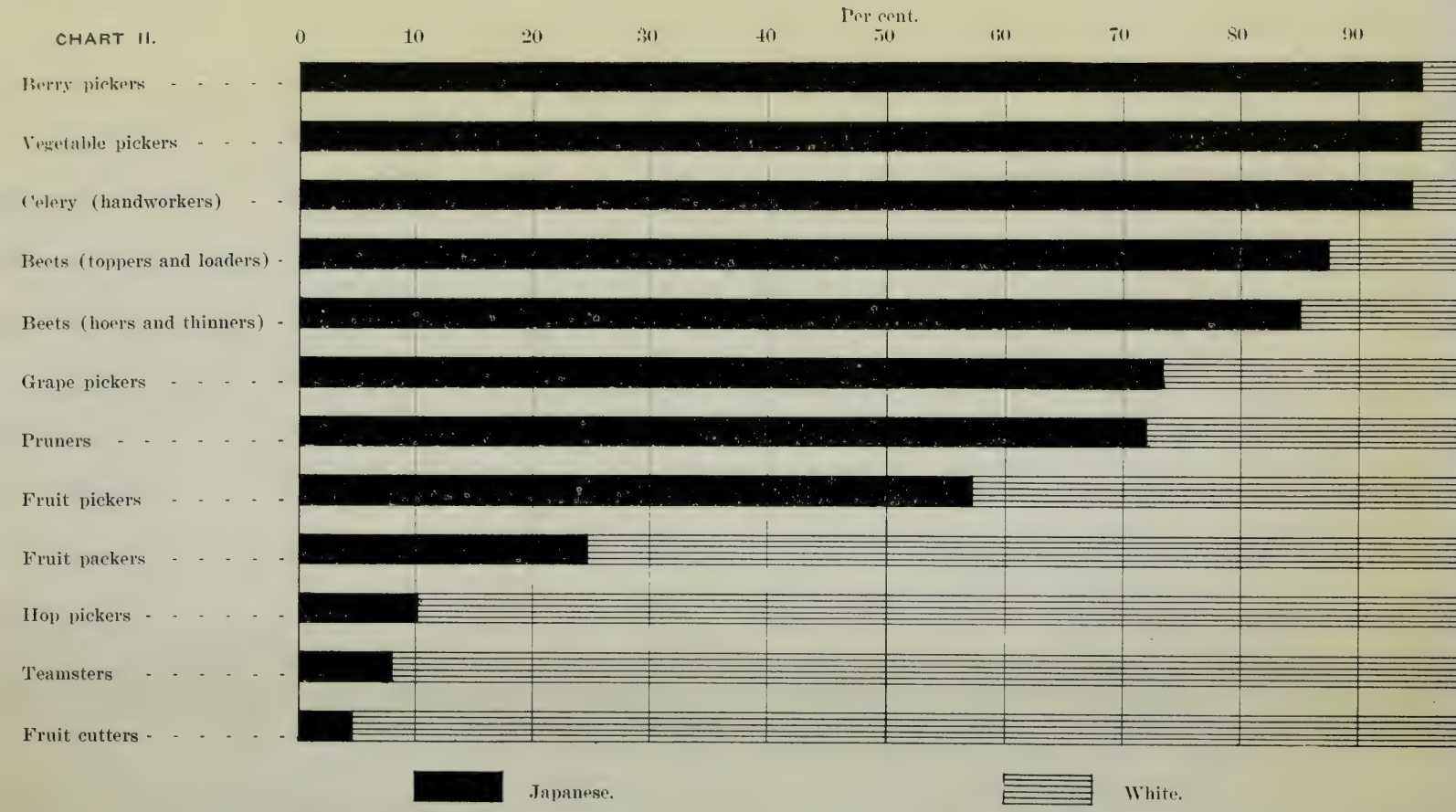

CHART II.
Per cent.
0
10
20
30
40
50
60
70
80
90
Berry pickers
Vegetable pickers
Celery (handworkers)
Beets (toppers and loaders)
Beets (hoers and thinners)
Grape pickers
Pruners
Fruit pickers
Fruit packers
Hop pickers
Teamsters
Fruit cutters
Japanese.
White.

TABLE VIII. Comparison of Wages Paid by White Farmers Employing Whites Only, White Farmers Employing Whites and Japanese and Japanese Farmers (By occupations.)

Occupations.	White farmers employing whites only.						White farmers employing whites and Japanese.								Japanese farmers employing Japanese.					
	With board.			Without board.			Whites.						Japanese.							
							With board.			Without board.			With board.			Without board.			With board.			Without board.		
	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.
Berry pickers										9	$1 86	10	36	$1 54	59	$1 63	196	1402	$1 52	81
Berry pickers (F.)												80			25	1 39	28	77	1 49	4
Box makers																				
Celery cutters																				
Cotton pickers										20	1 50		16	1 50	104	1 50		153	1 50	
Cultivators			20			82														
Cultivators	16	$1 33	3	26	$2 10	6	992	$1 20		111	1 69	3	6	1 62	127	1 54	1	1069	1 55	2
Curers																				
Dryers	55	1 32		126	1 88		135	1 19	7	52	1 94	4			17	1 75		16	1 81	
Farm hands	1466	1 37	16	608	1 89	41	1190	1 31		1187	1 70	26	150	1 41	2026	1 47	572	981	1 48	25
Firemen	14	2 50		8	2 50		16	2 50		16	2 50									
Foremen	19	2 13		29	2 16		25	2 08	1	68	2 20				22	1 77				
Fruit cutters	16	1 25		7	1 71	32	2	1 50	16	99	1 53	233			7	2 00	21	15	1 75	8
Fruit cutters (F.)				32	1 85	673	40	1 50	11	135	1 63	1408			4	1 25		34		
Fruit pickers	117	1 18		1103	1 58	1390	155	1 31		1124	1 73	383	12	1 54	3186	1 38	1746	1153	1 63	12
Fruit pickers (F.)				21	1 60	113						18						6	1 60	
Gardeners																		99	1 50	
Grape pickers	256	1 22	51	194	1 85	1167	101	1 25	60	147	2 00	358	29	1 52	939	1 75	1235	809	1 14	168
Grape pickers (F.)				7	1 85	60											29			
Harvest hands	180	1 85	8	167	2 47	16	10	2 50				55					150			
Hoers				343	1 85	66				273	1 88	7			274	1 69	115	109	1 57	4
Hoers and thinners					1 85	7									66	1 73	988	35	1 75	
Hop pickers						1770						2554					689	3	1 50	150
Hop pickers (F.)						876						1277					52			
Irrigators	1	1 75		9	2 05		5	1 50							18	1 75				
Kilnmen	29	2 36		12	2 50		55	2 50		16	2 50									
Laborers	16	1 03		64	1 94	6	113	1 30		186	1 84		1	1 60	1067	1 45	276	42	1 67	
Melon pickers																		41	2 50	
Miscellaneous	61	1 71	4	112	2 06	2	304	1 68		182	1 64	19	8	1 50	639	1 77	54	42	2 27	
Packers	10	1 25				17	11	1 00		165	1 78	17			110	1 57	6	83	1 95	11
Packers (F.)	4	1 25		49	1 96		28	1 03		270	1 70	395					3	2	1 62	10
Pitters										4	1 50	745					20			
Pitters (F.)			200			406				15	1 50	195								
Planters													12	1 70	96	1 56				
Pruners	34	1 69	1	99	1 82	88	226	1 23		225	1 96	15	26	1 96	1468	1 39	17	75	1 75	17
Pullers and setters															181	1 27				
Sub-bosses															1	2 50				
Teamsters	237	1 48	1	101	2 04	1	1281	1 42	1	454	1 75	10	10	1 66	79	1 74		1	1 40	
Teppers and hoppers				2	2 00	11						16			38	1 70	1	85	2 00	
Vegetable pickers	41	51					49	1 50		22	1 67	9	32	1 53	50	1 74	67	1658	1 55	3
Weeders										4	1 50				91	1 56				
Totals	2457	$1 38	407	3142	$1 89	6757	1867	$1 28	96	5189	$1 80	7372	335	$1 49	10676	$1 54	10481	4834	$1 57	891
Males	2952	1 48	107	3015	1 90	4629	1737	1 38	85	4769	1 82	1089	345	1 49	10631	1 55	10589	6660	1 57	852
Females	1	1 25	300	127	1 68	2128	30	1 30	11	420	1 67	3283			52	1 15	112	158	28	37

Occupations.	Japanese farmers employing Japanese.					
	Without board.					
	Number on fixed wage.	Average wage per day.	Number on contract.	Number on fixed wage.	Average wage per day.	Number on contract.
Berry pickers	1402	$1 52	81	1502	$1 50	45
Berry pickers (F.)	4	1 49	4	45	1 41	
Box makers				31	1 57	
Celery cutters				153	1 50	
Cotton pickers						
Cultivators	1069	1 55	2	1126	1 45	15
Curers				24	1 12	
Dryers	16	1 81		17	1 99	
Farm hands	981	1 48	25	1882	1 49	18
Firemen						
Foremen				1	1 50	
Fruit cutters	34			74	1 96	10
Fruit cutters (F.)				4	1 82	15
Fruit pickers	1746	1 63	12	986	1 82	160
Fruit pickers (F.)	6	1 60				
Gardeners	99	1 50		171	1 50	
Grape pickers	809	1 14	168	368	1 72	988
Grape pickers (F.)	29					
Harvest hands	150					
Hoers	109	1 57	4	121	1 57	
Hoers and thinners	35	1 77		91	1 75	51
Hop pickers	689	1 50	150			
Hop pickers (F.)	52					
Irrigators	18	1 75				
Kilnmen						
Laborers	1067	1 45	276	42	1 67	
Melon pickers				41	2 50	
Miscellaneous	639	1 77	54	50	1 94	
Packers	110	1 57	6	83	1 95	11
Packers (F.)			3	2	1 62	10
Pitters			20			
Pitters (F.)						
Planters	96	1 56		145	1 46	
Pruners	1468	1 39	17	75	1 75	17
Pullers and setters	181	1 27		192	1 56	
Sub-bosses	1	2 50				
Teamsters	79	1 74		1	1 40	
Teppers and hoppers	38	1 70	1	85	2 00	
Vegetable pickers	50	1 74	67	1658	1 55	3
Weeders	91	1 56				
Totals	10481	1 57	891	8291	$1 47	1472
Males	10589	1 57	852	8250	1 46	1255
Females	158	28	37	42	1 40	17

TABLE VIII.—Comparison of Average Prices by Metric Tonnes and Short Tons.

TABLE IX. White and Japanese Labor Employed by White and Japanese Farmers, Showing Percentage Employed on Fixed Wage and on Contract.

OCCUPATIONS.	White farmers employing whites only.			White farmers employing whites and Japanese.						Japanese farmers employing Japanese.		
				White employees.			Japanese employees.					
	Number of employees.	Percentage on fixed wage.	Percentage on contract.	Number of employees.	Percentage on fixed wage.	Percentage on contract.	Number of employees.	Percentage on fixed wage.	Percentage on contract.	Number of employees.	Percentage on fixed wage.	Percentage on contract.
Berry pickers				19	47.4	52.6	291	32.6	67.4	2690	95.3	4.7
Berry pickers (F.)				80		100.0	53	47.2	58.8	116	96.6	3.4
Box makers										31	100.0	
Celery cutters				20	100.0		111	100.0		153	100.0	
Cotton pickers	102		100.0							15		100.0
Cultivators	81	88.9	11.1	536	99.4	0.6	137	97.1	2.9	1197	99.8	0.2
Curers										24	100.0	
Dryers	181	100.0		218	95.0	5.0	15	100.0		33	100.0	
Farmhands	2131	97.3	2.7	2703	99.0	1.0	2748	79.2	20.8	2469	95.0	5.0
Firemen	22	100.0		32	100.0							
Foremen	48	100.0		144	99.3	0.7	22	100.0		1	100.0	
Fruit cutters	55	41.8	58.2	350	28.9	71.1	29	27.6	72.4	57	68.4	31.6
Fruit cutters (F.)	725	7.2	92.8	1594	11.0	89.0	4	100.0		48		100.0
Fruit pickers	2910	52.2	47.8	2262	83.1	16.9	4914	65.1	34.9	2581	94.5	5.5
Fruit pickers (F.)	134	15.7	84.3	18		100.0				6	100.0	
Gardeners										270	100.0	
Grape pickers	1598	28.2	71.8	666	37.2	62.8	4693	20.4	79.6	2028	33.4	66.6
Grape pickers (F.)	65	7.7	92.3				29		100.0			
Harvest hands	365	95.1	4.9	65	15.4	84.6	150		100.0			
Hoers	409	83.9	16.1	280	97.5	2.5	719	38.1	61.9	225	98.2	1.8
Hoers and thinners	12	41.7	58.3				1054	6.3	93.7	146	85.6	14.4
Hop pickers	1770		100.0	2554		100.0	689		100.0	153	2.0	98.0
Hop pickers (F.)	876		100.0	1277		100.0	52		100.0			
Irrigators	10	100.0		5	100.0		48	100.0				
Kilnmen	41	100.0		101	100.0							
Laborers	116	94.8	5.2	299	100.0		1344	79.5	20.5	158	100.0	
Melon pickers										915	100.0	
Miscellaneous	181	96.7	3.3	505	96.2	3.8	401	86.5	13.5	32	100.0	

TABLE IX. White and Japanese Labor Employed by White and Japanese Farmers, Showing Percentage Employed on Fixed Wage and on Contract—Continued.

OCCUPATIONS.	White farmers employing whites only.			White farmers employing whites and Japanese.						Japanese farmers employing Japanese.		
				White employees.			Japanese employees.					
	Number of employees	Percentage on fixed wage	Percentage on contract	Number of employees	Percentage on fixed wage	Percentage on contract	Number of employees	Percentage on fixed wage	Percentage on contract	Number of employees	Percentage on fixed wage	Percentage on contract
Packers	57	70.2	29.8	194	92.3	7.7	446	98.7	1.3	602	93.2	6.8
Packers (F.)	52	100.0	----	603	49.4	50.6	3	----	100.0	21	42.9	57.1
Pitters	----	----	----	349	1.1	98.9	20	----	100.0	----	----	----
Pitters (F.)	606	----	100.0	210	7.1	92.9	----	----	----	----	----	----
Planters	----	----	----	----	----	----	108	100.0	----	145	100.0	----
Pruners	224	58.9	41.1	496	90.9	9.1	1889	76.4	23.6	398	87.2	12.8
Pullers and setters	----	----	----	----	----	----	181	100.0	----	192	100.0	----
Sub-bosses	----	----	----	36	100.0	----	4	100.0	----	----	----	----
Teamsters	340	99.4	0.6	1749	99.4	0.6	69	100.0	----	147	94.6	5.4
Toppers and loaders	16	12.5	87.5	16	----	100.0	1203	1.5	98.5	125	88.8	11.2
Vegetable pickers	34	100.0	----	77	92.2	7.8	179	62.6	37.4	2053	99.0	1.0
Weeders	----	----	----	4	100.0	----	94	100.0	----	125	100.0	----
Totals	13161	46.3	53.7	17464	57.2	42.8	21702	50.8	49.2	17230	87.5	12.5
Males	10703	55.8	44.2	13680	69.5	30.5	21558	51.0	49.0	16966	87.7	12.3
Females	2458	5.3	94.7	3784	12.9	87.1	144	22.2	77.8	264	75.8	24.2

CHART III.

Seasonal Employment of White and Japanese Farm Labor.

In this chart there is shown the season or period of employment of both white and Japanese farm labor. The numbers employed have been reduced to a percentage basis, and each column shows for the month the percentage to the total number employed during the year. The data used in compiling is the same as that in Chart I. It will be noticed that during the month of September the greatest number of both white and Japanese laborers are employed. In the case of the white farm laborer, about twelve times as many were required in the month of September as in the month of January. It will also be noted that the Japanese labor is more evenly distributed throughout the year than the white labor. This is due in a large measure to the mobility of the Japanese laborer, that is, his ability to travel from one district to another with the ripening of the various crops, thus spreading his labor over a greater period of time. The chart brings out very plainly the important fact that the bulk of farm labor is required only for a few months of the year, namely, from July to October.

CHART III.

Per cent
mployed
ch month.
WHITE.
JAPANESE.
25
20
15
10
5
0
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.

TABLE X. Temporary Help Employed by White Farmers.
(Showing Average Duration of Employment.)

Average duration of employment.	White.			Japanese.		
	Total Male and Female.	Male.	Female.	Total Male and Female.	Male.	Female.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Less than 1 week	0.96	1.15	0.27	4.53	4.57	----------
1 week to 2 weeks	7.49	6.97	9.32	5.42	5.31	18.71
2 weeks to 3 weeks	12.90	11.03	19.59	6.16	6.11	11.70
3 weeks to 1 month	13.00	11.70	17.65	5.16	5.08	16.37
1 month to 2 months	22.64	18.92	35.99	17.88	17.96	7.60
2 months to 3 months	11.26	11.63	9.95	22.51	22.53	19.30
3 months to 4 months	5.56	6.18	3.37	11.27	11.33	2.93
4 months to 5 months	4.26	5.13	1.14	10.21	10.21	9.94
5 months to 6 months	2.43	2.90	0.78	2.01	1.98	5.85
6 months to 1 year	2.85	3.26	1.37	4.20	4.23	1.17
Permanent	16.65	21.13	0.57	10.65	10.69	6.43
Totals	100.0	100.0	100.0	100.0	100.0	100.0

TABLE XI. Temporary Help Employed by White Farmers.
(Showing Percentage Employed Each Month of the Year.)

Months.	White.			Japanese.		
	Total Male and Female.	Male.	Female.	Total Male and Female.	Male.	Female.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
January	2.52	3.23	0.06	4.22	4.24	----------
February	2.99	3.85	----------	5.43	5.45	----------
March	3.33	4.30	----------	5.71	5.74	----------
April	3.51	4.32	0.75	5.32	5.34	----------
May	6.18	6.73	4.25	7.70	7.71	4.69
June	8.72	8.04	11.05	7.74	7.73	9.86
July	12.50	10.58	19.09	8.14	8.11	16.43
August	18.41	15.60	28.13	11.04	11.02	15.96
September	29.09	28.10	32.54	22.33	22.21	46.96
October	7.28	8.49	3.12	12.83	12.87	4.69
November	3.35	4.11	0.74	5.99	6.01	1.41
December	2.12	2.65	0.27	3.55	3.57	----------
Totals	100.0	100.0	100.0	100.0	100.0	100.0

TABLE XII. Total Production of Sugar Beets in California, 1909.

(Showing Race of Farmer, Number of Farms, Acres Planted, Total and Average Production, and Value of Crops.

Race of farmer.	Total number of farms.	Total acreage planted to beets.	Average acres per farm.	Total tons of beets produced.	Average production per acre.	Total value of beets.
White	†1,180	71,213	*44.1	864,975	12.2	$4,324,875
Japanese	94	5,200	55.3	51,401	9.9	257,005
Chinese	16	904	56.5	12,071	13.3	60,355
Totals	1,290	77,317	*45.0	928,447	12.0	$4,642,235

†In addition 6,000 acres were planted and about 3,500 harvested by a Sugar Company, producing 20,000 tons, valued at $100,000.

*Holdings of Sugar Companies (19,570 acres) included in total, but not in average acreage.

MINING

TABLE I. Wages Paid in Ledge Mining.

Occupations.	Total number of employees considered.	Wages per day.													
		$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
Foremen	99									2	1	7		21	68
Engineers	172						4	1		76	15	46		20	9
Firemen	19									3		9		1	5
Machinists	106	1						5	2	13	6	24	5	29	21
Blacksmiths	138					1		29	7	35	5	35	3	15	14
Carpenters	60							3		6	3	8	13	21	6
Timbermen	293							17	18	147	66	8		33	4
Drillers	716							21	18	449	163	80		11	4
Compressormen	50					1		7		33	3	3		3	
Miners	885					1		63	174	454	45	85	3	60	
Muckers	707						214	306	116	37			4		
Carmen	466					5	4	314	35	105	1	2			
Shift bosses	89									2	5	39	10	19	14
Amalgamators	98							1		20	3	46	1	12	15
Concentrators	52							13	8	23	4	1	3		
Millmen	72							4	2	24	3	23	1	6	9
Cyaniders	23							9		13				1	
Laborers	174		1		2	15	20	72	20	35	1	4		3	1
Clerks	79		1			1		13		12	4	18	3	5	22
Miscellaneous	282	1	1	3	4	9	13	44	28	82	24	22	7	18	26
Totals	4610	2	3	3	6	33	285	922	424	1571	352	460	53	278	218

TABLE II. Wages Paid in Dredge Mining.

Occupations.	Total number of employees considered.	Wages per day.												
		$1.00	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
Foremen	37										1			36
Dredgemasters	32												2	30
Engineers	40								16	3			21	
Oilers	288						178	6	104					
Blacksmiths	88					1	21	18	15	2	19	7	1	4
Carpenters	41								7	2	23	6	3	
Machinists	45						8		5	2	19	5	6	
Winchmen	124								124					
Amalgamators	9								1	3			3	2
Clerks	35					7	2		9		9		1	7
Laborers	218	4	4	22	30	42	88	28						
Miscellaneous	58				4	1	10	1	5		6			31
Totals	1015	4	4	22	34	51	307	53	286	12	77	18	37	110

TABLE III. Wages Paid in Smelters and Refineries.

Occupations.	Total number of employees considered.	Wages per day.									
		$1.25	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$4.00	Over $4.00
Office	30						1			6	23
Foremen	53				1	3	4	1	4		40
Mechanics	56			3	4	16	9	1	11	8	4
Engineers	7							2	2	1	2
Firemen	6					3	2		1		
Electricians	9				5				4		
Refiners	44				22	1		11	4	4	2
Furnace men	433		12		79	15	151		132	5	39
Converter men	133		5		63		35		24	2	4
Miscellaneous	165	1	22	74	35	7	16	1	9		
Totals	936	1	39	77	209	45	218	16	191	26	114

OIL

TABLE I. Wages Paid in the Oil Fields of California.

Occupations.	Total number of employees considered.	Number receiving wages with board.	Wages with board.												
			Under $2.00	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.50	$5.00	$6.00	Over $6.00
Superintendents	132	49								2		2	13	7	2	23
Foremen	141	85						7	1	20		19	21	10	1	6
Gaugers	58	43		2	2	10	13	15		1						
Engineers	51	24			1		1	1	1	7	5	6	2			
Firemen	81	59		1				37	2	8	6	5				
Machinists	129	105	1				7	22	7	20	9	21	12	5	1	
Blacksmiths	69	49	1	1		2		12	2	7	5	8	2	6	2	1
Steamfitters	58	30					3	12	1	10	1	3				
Carpenters	235	189				7	8	44	4	35	2	37	49	3		
Well drillers	637	369										46	32	31	38	222
Toolies	584	298				2		38	5	204		20	27	1	1	
Oilers	158	50				1	42	3		4						
Pumpers	489	185	9		14	66	40	30	7	12		7				
Wellmen	423	302			1	50	143	15	57	26		9		1		
Drivers	353	234	9	11	17	114	57	16	8	1						
Laborers	1503	622	16	16	257	172	72	22	27	38		2				
Miscellaneous	654	314	92	23	42	30	36	42	8	25	3	9	9			1
Totals	5755	3007	128	54	334	454	422	316	130	420	31	194	162	64	45	253

TABLE I. Wages Paid in the Oil Fields of California—Continued.

Occupations.	Number receiving wages without board	Wages without board.													
		Under $2.00	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.50	$5.00	$6.00	Over $6.00
Superintendents	83										7	7	10	12	47
Foremen	56				1			1	9	1	5	4	17	5	13
Gaugers	15				2		4		6			1	2		
Engineers	27						3	3	12		3	4	1	1	
Firemen	22						2		20						
Machinists	24						1		4	1	3	1	14		
Blacksmiths	20						1	1	4		4	7	3		
Steamfitters	28				1			9	7		2	8	1		
Carpenters	46								2		21	15	6		2
Well drillers	268										33	4	8	123	100
Toolies	286				2		12	11	142	6	25	85	3		
Oilers	108				1	78	17	2	10						
Plumbers	304				24	18	118	41	89	9	5				
Wellmen	121				5	18	34	4	27	2	13	17	1		
Drivers	119			3	5	11	22	21	48		6	3			
Laborers	881		11	18	454	136	118	18	63	48	13	1	1		
Miscellaneous	340	7	4	11	104	36	73	28	28	2	27	15	1	2	2
Totals	2748	7	15	32	599	297	405	139	471	69	167	172	68	143	164

TABLE II. Oil Fields of California.

(Showing Location and Number of Wells of Companies Reporting.)

Fields.	Total number of companies reporting.	Total number of wells.	Wells.		
			Pumping.	Flowing.	Drilling.
Coalinga	42	315	235	3	77
Kern River	51	663	621		42
Los Angeles	5	169	145	3	21
Midway	19	98	35	7	56
McKittrick	8	110	96		14
Santa Maria	13	214	181	1	32
Santa Paula	7	203	191	1	11
Sunset	8	71	40	4	27
Miscellaneous	7	8		1	7
Totals	160	1851	1544	20	287

TABLE III. Hours of Labor and Wages Paid on Oil Pipe Lines.

Occupations.	Total number of employees considered.	Hours per day.				Wages per day.												
		8	9*	10	Over 10	$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.00 Over
Superintendents	16	3	11	2															16
Foremen	68		64	4									3	8	9	29		3	16
Clerks	87	66	15	6				1		1	1	24	14	18	4	8	1	15	
Engineers	105		46		59									20		16	51	18	
Pumpers	38				38								15	11		12			
Firemen	120		45		75								67	53					
Machinists	42	18	24										3	16	2	2	5	10	4
Machinists, helpers	15	5	10							5		2	1	7					
Blacksmiths	5		5											2			3		
Brick masons	12		2		10									1					11
Boilermakers	15	8	7								1	1	2			2	1	7	1
Teamsters	45		44	1				1		2		33	9						
Carpenters	63	30	33										6	14	2	1	2	31	7
Line riders	23		21	2								2	7	2		3	8	1	
Pipe fitters	19		19											1	5	6	2	5	
Inspectors	14		14									2						4	8
Laborers	774	10	705	59		4				33	95	241	320	60	6	2		12	1
Miscellaneous	114	11	89	5	9			5	10	5	4	2	19	26	11	13	1	10	8
Totals	1575	151	1154	79	191	4		7	10	46	101	307	466	239	39	94	74	116	72

TABLE IV. Hours of Labor and Wages Paid in the Oil Refineries.

Occupations.	Number of employees considered.	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$21.00 to $24.99	$25.00 and over.
Foremen	10		4	2	4								2	8
Office help	18	3	13		2			1	2	1	2	2	1	9
Fillers and shippers	90		46	7	37				5	9	33	5	36	2
Engineers	7		1	2	4							2	4	1
Mechanics	290	204	78	7	1			4	14	26	100	40	80	26
Acid makers	115		42	1	72					6	35	2	66	6
Stillmen	43				43								36	7
Teamsters	35		34	1						26	4	4		1
Oil treaters	107	16	26	6	59				5	6	18	5	62	11
Laborers	152		141	5	6			1	1	122	13	10	2	3
Miscellaneous	44		11	2	31				4	13	10	10	3	4
Totals	911	223	396	33	259			6	31	209	215	80	292	78

SELECTED INDUSTRIES

TABLE I. Hours of Labor and Wages Paid in the Fruit Canning Industry of California.

Occupations.	Number of employees considered.	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$21.00 to $24.99	$25.00 and over.
Male Employees.														
Superintendents and managers	17			16	1									17
Office help	26	5	3	15	3				1	1	2	10	4	8
Foremen	43			37	6					5	4	21	4	9
Shipping clerks	9		1	7	1						5	4		
Receiving clerks	10			9	1				1	3	4	2		
Engineers	20			13	7					2	1	7	2	8
Boxmakers	31			25	6					4	9	10	8	
Boxlidders	33			31	2				2	21	10			
Truckers	152			137	15				55	87	4	6		
Weighers	14			12	2					2	5	7		
Graders	65			55	10				40	18	5	1		1
Car loaders	14			14						10	4			
Syrup makers	17			14	3				1	6	5	4	1	
Syrupers	31			22	9				11	12	4	4		
Cookers	107			72	35			12	10	42	23	18		2
Warehousemen	190			152	38			8	55	107	12	7		1
Solderers	119			63	56			1	16	10	28	33	14	17
Cutters	193			96	97			27	50	115	1			
Canners	70			70					50	15	5			
Laborers	979			603	376		8	25	315	486	129	12	4	
Miscellaneous	112			80	32				47	35	23	3	2	2
Totals	2252	5	4	1543	700		8	73	654	981	283	149	39	65

TABLE I. Hours of Labor and Wages Paid in the Fruit Canning Industry of California—Continued.

Occupations.	Number of employees considered	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$21.00 to $24.99	$25.00 and over
Female Employees.														
Office help	21	2	1	17	1				3	5	7	5		1
Foreladies	51			22	29			7		15	18	7		4
Cutters	3456	200		2185	1071	8	128	629	1175	887	434	164	12	19
Canners	1136			781	355		30	234	210	348	196	113	5	
Labelers	93			73	20			6	55	24	8			
Miscellaneous	123			111	12		2	20	80	21				
Totals	4880	202	1	3189	1488	8	160	896	1523	1300	663	289	17	24

TABLE II. Hours of Labor and Wages Paid in the Fruit Packing Houses of California.

Occupations.	Number of employes considered.	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$21.00 to $24.99	$25.00 and over.
Male Employees.														
Superintendents and managers	144	1	1	117	25							4	2	138
Foremen	160		1	148	11					2	22	34	30	72
Office help	168	2	5	140	21	1		1	4	4	25	44	23	66
Engineers	72		1	68	3			1		7	17	26	14	7
Boxmakers	326		8	308	10				4	34	28	155	64	41
Boxlidders	145		2	138	5				5	36	36	45	17	6
Truckers	563		4	508	51				32	396	114	21		
Doormen and weighers	274		3	255	16					146	80	30	7	11
Graders	339		16	316	7				84	161	60	34		
Sorters	112		9	103				15	60	37				
Dumpers	31		1	29	1					6	21	4		
Cutters	74		9	65			20	45			9			
Car loaders	163			120	43					48	38	47	28	2
Packers	200		10	190				5	26	42	43	21	33	30
Stemmers	265			265						202	32	30	1	
Dippers	96			92	4				15	61	14	5	1	
Pressmen	135			133	2				2	106	9	14	4	
Laborers	1808		74	1683	51	1	1	30	202	1322	212	40		
Miscellaneous	295		1	272	22			4	17	186	55	16	6	11
Totals	5370	3	145	4950	272	2	21	101	451	2796	815	570	230	384

TABLE II. Hours of Labor and Wages Paid in the Fruit Packing Houses of California—Continued.

Occupations.	Number of employees considered.	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$25.00 and over.	$21.00 to $24.99
Female Employees.														
Office help	78	5	6	50	17	------	1	3	7	17	21	19	4	6
Foreladies	91	------	13	77	1	------	------	1	9	27	34	19	------	1
Packers	4632	28	411	4008	185	12	84	741	1056	1138	741	742	78	40
Sorters	424	------	38	386	------	------	------	258	121	30	15	------	------	------
Carton makers	105	------	24	81	------	------	11	------	28	28	37	1	------	------
Labelers	77	------	5	72	------	1	------	10	60	6	------	------	------	------
Cutters	549	------	5	544	------	------	------	284	153	80	7	------	25	------
Miscellaneous	246	------	27	214	5	------	2	40	122	71	6	1	------	4
Totals	6202	33	529	5432	208	13	98	1337	1556	1297	861	782	107	51

TABLE III. Hours of Labor and Wages Paid to Employees in the Wineries of California.

Occupations.	Number of employees considered	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$21.00 to $24.99	$25.00 and over.
Superintendents and managers	38	3	2	31	2					2	4	4	3	25
Bookkeepers	20	2	1	12	5				3	4	5	3		5
Winemakers	22	1		13	8			1		5	2	5	1	8
Distillers	27			23	4					5	9	6	5	2
Engineers	37	1	1	29	6				1	5	7	12	8	4
Crushermen	32	2		25	5				16	8	8			
Cellarmen	193		37	126	30		2	21	44	89	22	7	6	2
Laborers	371		16	288	67			41	116	199	9	1	3	2
Miscellaneous	50	1	7	41	1			1	15	14	13	1	5	1
Totals	790	10	64	588	128		2	64	195	331	79	39	31	49

TABLE IV. Hours of Labor and Wages Paid at Sugar Refineries and Factories.

Occupations.	Number of employees considered.	Hours per day.				Wages per day.												
		8	9	10	Over 10	$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
Managers and superintendents	18	5	4	3	6									1					17
Office help (M.)	116	22	53	8	33			1		7	1	18	29	23	8	23		4	2
Office help (F.)	15	1	7	4	3					5	2	5		3					
Laboratory help	217	12	4	4	197	2	3	13	6	3	71	11	66	28	3	9		1	1
Foremen	110		18	1	91							8	6	37	13	16		23	7
Engineers	52	7	7	1	37							5	4	22		7	2	2	10
Firemen	45	11	7		27				1			4	9	23		7	1		
Blacksmiths	14	4	3	2	5				1	1				7		3		1	1
Carpenters	40	15	12		13							2	8	7	1	8	1		13
Machinists	250	47	56	2	145				14	10	13	29	17	54	3	71		22	17
Machinists, helpers	59		54		5						19	1	2	6	2	10	14	2	3
Oilers	36		4		32					5	2	9	4	14			2		
Pressmen	139				139					33	6	84		14	2				
Beet sugar men	657				657			4	8	191	57	154	95	112	17	17			2
Cane sugar men	703	9	6		688				288	211		84	1	105	12	2			
Limekiln men	143				143					21	32	77	5	6	2				
Laborers	1040		419	16	605		5	29	195	163	107	369	53	103	6	6			4
Warehousemen	96				96					24	11	26	6	27				2	
Miscellaneous (M.)	130	3	28	13	86				5	21	10	58	7	12	5	11	1		
Miscellaneous (F.)	35		30	5		15	10	5		5									
Totals	3915	136	712	59	3008	17	18	52	518	700	331	944	312	604	74	190	21	57	77

TABLE V. Hours of Labor and Wages Paid by Light and Power Companies.

Occupations.	Number of employees considered	Hours per day.				Wages per day.													
		8	9	10	Over 10	Under $1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
General officers	21	21												1		2			18
Managers and superintendents	84	70	13	1						1			1	2		1		3	76
Office help (M.)	550	430	88	31	1	12	8	12	27	26	23	93	46	107	27	52	28	53	36
Office help (F.)	149	132	17			8	9	27	13	26	22	17	9	11	1	2	1	3	
Foremen	184	106	55	23								5	5	14	11	33	11	36	69
Inspectors	38	29	4	5								1		1	1	14	2	13	6
Engineers	108	55	30	23		1				2		2	6	20	6	17	3	12	39
Firemen	102	62	18	20	2					1	5	28	21	13	16	5	1	6	6
Oilers	76	50	21	5				1	1	7	11	8		48					
Mechanics	275	105	137	33			3			3	11	48	36	57	20	38	18	28	13
Electricians	81	55	24	2					3	1	3	11	4	15	9	7	3	15	10
Dynamo and switchboard men	269	190	48	31		1	1	4	3	25	12	60	38	72	10	34	2	5	2
Linemen	327	209	65	53		1		1	1	2	1	18	10	11	46	17	9	172	38
Groundmen	66	52	14								20	31				2		11	2
Meter readers	128	64	9	55					1	1	24	35	11	2	1		53		
Meter testers	124	88	10	26						1	11	28	19	16	5	31	2	10	1
Lamp trimmers	66	25	27	14						6	8	4	1	29	7	1	5	3	2
Ditch and patrol men	130	31	52	47		3			6	23	2	33	24	9	5	9		14	2
Collectors	134	120	14			1		4	1	2		41	13	25	5	19	14	8	1
Solicitors	87	74	13						1		1	15	13	15	12	14	4	7	5
Gasmakers	106	67	13	26				1		1	8	3	4	49	5	14	10	10	1
Servicemen	412	323	25	64		2				23	17	58	183	30	1	42	54	2	
Painters	101	98	1	2							2	9	66	21		2		1	
Laborers	1635	918	365	352						404	356	721	99	48	3	3		1	
Miscellaneous	328	121	57	140	10	20	3	10	6	31	44	84	20	44	4	19	5	4	34
Totals	5581	3495	1120	953	13	49	24	60	63	586	581	1353	629	660	195	378	225	417	361

TABLE VI. Hours of Labor and Wages Paid by Water Companies.

Occupations.	Number of employees considered.	Hours per day.				Wages per day.												
		8	9	10	Over 10	$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
General officers	15	15																	15
Managers and superintendents	17	16			1									1			1		15
Office help (M.)	173	173				2		3	2	4	10	2	3	25	3	13	17	8	81
Office help (F.)	38	38						6	1	9	5	3	4	5	1	1	2	1	
Foremen	62	50			12					1	1	1	14	7	3	10	5	8	12
Inspectors	36	36						1			3	19		3	2	1	1	1	5
Meter men	49	49										3	2			20	22		2
Filter men	16	16									5			11					
Reservoir men	30	30								5	1	14		10					
Service men	33	33										13		19		1			
Engineers	52	43		2	7											11	8	1	32
Firemen	60	55			5							4	3	15	1	37			
Mechanics	61	39			22	2					1		7	20	1	17	2	8	3
Collectors	16	16											1	2	1	3	5		4
Laborers	377	269			108			2	4	141	128	97	2	3					
Miscellaneous	37	20			17	8		4	3	3	4	9	3	3					
Totals	1072	898		2	172	12		16	10	163	158	165	39	124	12	114	63	27	169

TABLE VII. Wages of Employees in Lumber Woods and Sawmills.

Occupations.	Number of employees considered.	Wages per week.						
		$6.00 to $8.99.	$9.00 to $11.99.	$12.00 to $14.99.	$15.00 to $17.99.	$18.00 to $20.99.	$21.00 to $24.99.	$25.00 and over.
Foremen	159				11	21	16	111
Clerks	148	1	1	7	30	41	22	46
Mechanics	661	4	7	59	221	217	113	40
Blacksmiths	71				10	31	29	1
Filers	67			8	19	24	11	5
Sawyers	150	1	4	31	25	29	7	53
Setters	20				7	1	12	
Edgermen	56			2	8	24	22	
Millhands	1392	68	254	543	257	164	71	35
Engineers	147		2	5	14	59	41	26
Donkeymen	66		16	29	12	8		1
Firemen	147			33	71	42	1	
Trainmen	180			41	10	81	27	21
Timekeepers	12			6	6			
Tallymen	25			3	6	7	5	4
Teamsters	233			81	138	12	2	
Loaders	1206		63	429	620	87	7	
Fallers	438		145	150	119	24		
Loggers	1171	70	223	383	325	118	28	24
Offbearers	28			16	12			
Swampers	180			14	112	48	4	2
Hooktenders	33				7	4	22	
Laborers	2801	53	273	1672	708	70	25	
Cooks	46			9	23	12	2	
Waiters	20		6	14				
Miscellaneous	250	1	54	80	41	17	28	29
Totals	9707	198	1048	3615	2812	1141	495	398

TABLE VIII. Hours of Labor and Wages Paid at Powder Factories.

Occupations.	Number of employees considered.	Hours per day.			Wages per day.													
		8	9	10	$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
Superintendents and managers	16	5	3	8										3				13
Office help (M.)	22	9	5	8	2		1					1	2		1	3	1	11
Office help (F.)	4	3		1	1						2		1					
Foremen	43		30	13						1	4	1	6	3	7	2	4	15
Engineers	15	3	4	8									3	3	5			4
Firemen	9		3	6							6		2	1				
Mechanics	92	21	55	16		3		1	7	9	6	6	7	10	14		17	12
Acid men	53	4	1	48	1				1	8	7	12	8	6	8			2
Mill men	43	31	2	10				1	18		3	1	14	6				
Box and keg makers	41		40	1	2	1	9		8	1	3	9	5	2				1
Laborers	299		132	167					138	32	39	66	22			1		7
Miscellaneous (M.)	25		7	18		2	2		4	2	5	6	2		1	1		
Miscellaneous (F.)	21		12	9			10	2	2	3	4							
Totals	683	76	294	313	6	6	22	4	178	56	79	96	72	34	36	7	22	65

TABLE IX. Hours of Labor and Wages Paid at Cement Works.

Occupations.	Number of employees considered.	Hours per day.				Wages per week.								
		8	9	10	Over 10	Less than $3.00	$3.00 to $5.99	$6.00 to $8.99	$9.00 to $11.99	$12.00 to $14.99	$15.00 to $17.99	$18.00 to $20.99	$21.00 to $24.99	$25.00 and over.
Superintendents and managers	13			13										13
Office help	56		6	44	6			1	3		5	8	3	36
Foremen	50			44	6						10	11	7	22
Chemists	30		4	26				3	5	1	5	6	5	5
Engineers	28			19	9						7	7	3	11
Firemen	4			2	2							4		
Oilers	56				56						50		6	
Mechanics	190			159	31					10	12	25	113	30
Burners and helpers	113				113					57	14	31	7	4
Millers	40				40						8	32		
Drillers	13			13						4	9			
Laborers	1711			1195	516					1391	216	88	15	1
Packers	45			18	27						5	40		
Miscellaneous	81		4	63	14				3	34	13	10	6	15
Totals	2430		14	1596	820			4	11	1497	354	262	165	137

TABLE X. Hours of Labor and Wages Paid in the Hotels of San Francisco.

Occupations.	Number of employees considered.	Hours per day.				Wages per month.														
		8	9	10	Over 10.	$15.00 and under.	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$70.00	$80.00	$90.00	$100.00	Over $100.00.
Male Employees.																				
Clerks	258	114	39	42	63	1	1	6	5	8	14	8	27	1	54	5	26	25	7	26	44
Bookkeepers	56	27	12	15	2				2		2	1	1		1	1	1	4	18	14	11
Bell boys	205	84	73	15	33	3	21	92	30	18	32	2	7								
Elevator operators	55	19	15	12	9		5	5	6	3	28	1	1	5	1						
Engineers	65	44	9	5	7				2	1	3	1	5		3	3	3	4	34	4	2
Porters	160	37	55	39	29	1	3	13	19	8	30	40	28	3	10	3	1			1	
Cooks	191	33	54	104		2	3		2	5	33	1	4	3	2		3	49	39	10	35
Dishwashers	91	20	33	38					20	23	37		11								
Pantrymen	61	8	23	30					5	1	29	23	2	1							
Waiters	277	42	8	227					6	1	2	46	76		139		2	2		1	2
Bedmakers	12	5	1	2	4				3	3	4		2								
Miscellaneous	240	77	10	142	11			2	54	69	11	5	7	4	9	18	30	21	4	4	2
Totals	1671	510	332	671	158	7	33	118	154	140	225	128	171	17	219	30	66	105	102	60	96
Female Employees.																					
Clerks	25	17		6	2	1				1	3	1	5	2		1	2	2	1	5	1
Chambermaids	342	235	61	46		4	6	136	64	21	76	2	28		1				4		
Housekeepers	33	15	5	10	3		1	1	3	2	7	2	7		6	2	1			1	
Waitresses	180	165	6	8	1			16	43	102	16		3								
Miscellaneous	96	74	8	11	3		2	18	5	22	11	34	2		2						
Totals	676	506	80	81	9	5	9	171	115	148	113	39	45	2	9	3	3	2	5	6	1

TABLE XI. Hours of Labor and Wages Paid in the Hotels of Los Angeles.

Occupations.	Number of employees considered	Hours per day.				Wages per month.															
		8	9	10	Over 10	$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$70.00	$80.00	$90.00	$100.00	Over $100.00
Male Employees.																					
Clerks	103	32	21	29	21	-----	2	2	3	8	7	5	10	2	14	3	8	11	5	7	16
Bartenders	31	10	14	7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	3	21	5
Bell boys	105	39	38	25	3	35	27	24	6	2	9	-----	-----	-----	1	-----	1	-----	-----	-----	-----
Bus boys	45	40	-----	5	-----	-----	-----	-----	42	3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Elevator operators	43	15	12	14	2	2	2	3	3	6	20	7	-----	-----	-----	-----	-----	-----	-----	-----	-----
Engineers	43	4	13	22	4	-----	-----	1	-----	-----	1	3	9	2	4	3	2	3	4	9	2
Porters	60	3	18	25	14	1	-----	5	6	19	9	10	5	2	2	-----	1	-----	-----	-----	-----
Cooks	112	21	3	78	10	-----	-----	1	6	12	6	6	12	5	2	4	9	15	16	8	10
Dishwashers	66	8	9	40	9	-----	2	2	43	14	4	1	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pantrymen	40	6	10	20	4	-----	-----	3	16	13	4	3	1	-----	-----	-----	-----	-----	-----	-----	-----
Waiters	159	100	7	51	1	-----	3	3	4	38	62	24	2	-----	2	-----	4	4	6	2	5
Bedmakers	7	2	3	2	-----	-----	-----	-----	2	-----	5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Miscellaneous	146	63	34	42	7	-----	4	4	12	17	6	21	13	-----	19	1	21	11	8	6	3
Totals	960	343	182	360	75	38	40	48	143	132	133	80	52	11	44	11	46	46	42	53	41
Female Employees.																					
Clerks	44	23	9	11	1	-----	1	-----	1	10	13	-----	4	-----	4	1	6	3	1	-----	-----
Chambermaids	205	63	71	71	-----	-----	57	23	42	50	15	18	-----	-----	-----	-----	-----	-----	-----	-----	-----
Housekeepers	29	10	5	10	4	-----	1	7	2	3	3	6	2	-----	2	3	-----	-----	-----	-----	-----
Waitresses	205	96	86	23	-----	6	-----	38	70	54	3	33	-----	-----	-----	-----	-----	-----	-----	1	-----
Miscellaneous	91	31	17	35	8	2	12	16	16	5	21	7	3	2	5	-----	2	-----	-----	-----	-----
Totals	574	223	188	150	13	8	71	84	131	122	55	64	9	2	11	4	8	3	1	1	-----

TABLE XII. Hours of Labor and Wages Paid in Hotels of Miscellaneous Cities.

Occupations.	Number of employees considered	Hours per day.				Wages per month.														
		8	9	10	Over 10.	$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$70.00	$80.00	$90.00	$100.00	Over $100.00
Male Employees.																				
Clerks	84	12	12	42	18	----	----	----	1	4	6	1	6	7	13	5	10	5	9	8	9
Bartenders	7	----	----	7	----	----	----	----	----	----	----	----	1	----	1	----	2	3	----	----	----
Bell boys	134	26	49	46	13	84	39	----	4	6	1	----	----	----	----	----	----	----	----	----	----
Elevator operators	19	3	3	13	----	2	----	7	2	6	----	----	----	----	----	----	1	----	----	----	1
Engineers	38	6	----	23	9	----	----	----	9	----	2	1	----	1	7	2	3	2	6	3	2
Porters	59	4	----	49	6	5	6	9	9	11	10	1	6	----	2	----	----	----	----	----	----
Cooks	112	22	----	81	9	----	----	2	2	4	9	3	6	1	21	1	28	7	4	5	19
Dishwashers	66	6	8	50	2	----	----	13	46	6	1	----	----	----	----	----	----	----	----	----	----
Pantrymen	18	----	----	17	1	----	----	1	8	6	----	2	----	----	1	----	----	----	----	----	----
Waiters	176	70	59	44	3	----	----	52	30	18	53	----	10	----	3	----	3	2	3	2	----
Miscellaneous	178	38	46	87	7	2	----	18	57	7	18	9	10	2	10	5	18	1	8	8	5
Totals	891	187	177	459	68	93	45	102	168	68	100	17	39	11	58	13	65	20	30	26	36
Female Employees.																					
Clerks	18	3	1	8	6	----	----	1	7	3	1	----	2	----	2	----	1	----	----	1	----
Chambermaids	162	82	23	57	----	----	74	55	17	2	13	----	1	----	----	----	----	----	----	----	----
Housekeepers	12	1	1	7	3	----	----	1	----	----	3	----	3	----	1	2	2	----	----	----	----
Waitresses	401	160	102	126	13	----	74	199	113	4	9	----	2	----	----	----	----	----	----	----	----
Miscellaneous	105	54	15	36	----	3	9	43	11	19	6	1	4	1	6	----	1	----	----	1	----
Totals	698	300	142	234	22	3	157	299	148	28	32	1	12	1	9	2	4	----	----	2	----

TABLE I. Number and Occupations of Persons Employed in American Vessels Engaged in the Shipping of the Port of San Francisco.

(Showing Trade Engaged in, Motive Power, and Gross Tonnage of Vessels.)

Trade engaged in.	Number of vessels	Gross tonnage	Number of persons employed	Masters	Pilots	Mates	Purser	Surgeons	Freight clerks	Quartermasters	Carpenters	Boatswains	Seamen	Engineers	Wheelmen	Water tenders	Others	Wipers	Electricians	Firemen	Coal passers	Stewards	Stewardesses	Bakers	Butchers	Barbenders	Storekeepers	Watchmen	Porters	Cooks	Cabin help	Pantrymen	Waiters	Mess boys
Oriental																																	
Steam	7	63,228	275	7		35	7	7	11	28	7			60	4	16	22		7			22	11		7		7	17						
Sail	2	1,390	22	2		4					2		10																2	2			
Australian—																																	
Steam	3	18,505	488	3		9	3	3		12	3	3	42	27		9	18		3	87	96	12	9	9	6		3	5	6	18		9	81	12
Sail	23	24,936	329	23		46					13	1	203		2							1								24	6	10	
South and Central America—																																	
Steam	12	35,477	729	12		36	11	10	11	46	12	10	96	48		11	36			75	76	22		17	10		13	12		44		14	80	37
Sail	25	23,357	303	25		49					11		170		6															25	11	4	2
Hawaiian—																																	
Steam	13	76,318	545	13		39	6	2		38	13	12	82	62		24	60	24	2	42		18	2	2	2		8	2	2	29	4	2	49	6
Sail	27	27,342	357	27		54					18		207		1							2								25	4		7
Coastwise—																																	
Steam	178	189,390	4,913	178		402	27		28	100	24	21	1442	516	33	69	184	23	4	577	119	124	5	20	11	8	2	30	4	235	99	34	555	39
Sail	233	158,977	2,464	233		453					68	2	1336	2	37															227	46		42	18
Bay and River																																	
Steam	82	60,469	2,316	101	68	135	37		2		6		956	197		2	20	1	3	288		52	6	1				18	14	99	91		160	29
Sail*																																	
Towing																																	
Steam	29	3,189	236	32		28							43	40			15			48										26			4
Transportation Service—																																	
Steam	10	33,255	982	10		28			6	28	6	12	163	60	6	18	35		12	126	102	24	6	24	18		16	8	6	37	12	18	151	48
Miscellaneous																																	
Sail	34	54,353	484	34		68					8		307																	34	18			15
Totals	678	760,186	14,443	700	68	1386	91	22	58	252	191	61	5057	1012	89	149	390	48	31	1243	393	277	39	73	54	8	51	122	12	818	293	77	1141	217

*Sailing craft on the bay under 100 tons not considered



TABLE III. Wages Paid Japanese and Chinese Employees on American Vessels Engaged in the Shipping of the Port of San Francisco.
(Tabulated by Occupations.)

Occupations.	Number of employees	Wages per month.*															
		$25.00	$22.50	$20.00	$17.50	$15.00	$12.50	$11.00	$10.00	$9.00	$8.00	$7.00	$6.00	$5.00	$4.00	$2.50	No salary
Freight clerks	13					3			10								
Carpenters	2						2										
Sailmakers	7						2		5								
Boatswains	15					7	5		2		1						
Seamen	171											171					
Oilers	84						12			72							
Firemen	232							5	5	7	181	34					
Coal passers	197											197					
Bakers	21	2	5									9					5
Butchers	4											4					
Bartenders	7					5						2					
Storekeepers	10								2	5		3					
Watchmen	2											2					
Porters	35								3			25		2			5
Cooks	57		5	2	14	2	5		4			25					
Galley help	7											7					
Pantrymen	37						2		4			31					
Waiters	241						5		2			222	6			6	
Mess boys	86											13	39		4		30
Interpreters	7			4	1		2										
Totals	1235	2	10	6	15	17	35	5	37	84	182	745	45	2	4	6	40

*Japanese and Chinese are paid in Mexican silver. Wages in this table have been reduced to equivalent in United States gold coin.

TABLE IV. Steam Railroad Employees in California, Fiscal Year 1909-1910.

Occupations.	Number of employees.	Average daily wage.	Lowest average daily wage.	Highest average daily wage.
General officers	211	$13 75	$0 83	$22 04
Other officers	206	6 95	1 67	8 25
General office clerks	2834	2 55	83	3 77
Station agents	1116	2 64	82	3 50
Other station men	3903	2 42	1 09	3 09
Enginemen	1821	4 66	2 26	6 33
Firemen	1741	2 84	2 00	4 27
Conductors	1163	4 44	1 38	5 62
Other trainmen	3763	3 19	2 00	4 36
Machinists	1194	3 92	2 24	4 52
Carpenters	1751	3 15	2 18	4 04
Other shopmen	7880	2 67	2 13	3 42
Section foremen	1215	2 72	1 36	3 25
Other trackmen	11763	1 40	1 07	2 47
Switchmen, flagmen, and watchmen	803	1 94	19	2 89
Telegraph operators and dispatchers	926	3 04	66	4 59
Employees (floating equipment)	928	2 80	2 51	3 08
Other employees and laborers	6752	2 52	95	4 03
Total employees	49970			

TABLE V. Hours of Labor and Wages Paid to Employees of Electric Railroads.

Occupations.	Total number of employees considered.	Hours per day.				Wages per day.													
		8	9	10	Over 10	$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	Over $4.00
General officers	74	37	21	16	.....	.....	.....	.....	.....	1	.....	.....	1	1	.....	1	.....	1	69
Managers and superintendents	64	28	8	28	.....	.....	.....	.....	.....	.....	.....	1	.....	3	.....	1	.....	.....	59
Clerks (M.)	515	311	92	142	.....	12	10	12	23	57	26	86	95	83	33	54	.....	23	31
Clerks (F.)	142	100	23	19	.....	10	33	27	15	19	4	18	9	3	1	2	.....	1	.....
Foremen	225	.....	140	85	.....	.....	.....	3	.....	3	3	23	28	55	18	21	5	6	60
Inspectors	42	.....	20	22	.....	.....	.....	.....	.....	.....	.....	.....	20	10	7	2	2	1	.....
Conductors	3181	.....	530	2651	.....	.....	.....	.....	.....	2	212	1071	673	640	170	90	219	85	19
Motormen	2691	.....	531	2160	.....	.....	.....	.....	.....	3	267	972	584	506	186	66	32	55	20
Starters	78	4	10	64	.....	.....	.....	.....	5	1	4	3	5	18	.....	38	.....	.....	4
Station men	228	.....	124	104	.....	20	21	14	34	72	10	13	25	7	6	4	.....	.....	2
Switchmen	141	75	2	64	.....	.....	.....	23	3	61	4	16	23	5	6	.....	.....	.....	.....
Watchmen	45	.....	23	17	5	.....	.....	.....	4	30	7	2	2	.....	.....	.....	.....	.....	.....
Road and track men	3653	.....	2617	1036	.....	141	1645	571	298	334	331	154	34	127	.....	17	3	.....	2
Linemen	263	.....	172	91	.....	.....	1	.....	2	43	15	62	21	43	3	32	1	27	13
Electricians	149	.....	51	98	.....	.....	4	2	8	9	17	32	24	20	12	16	3	1	1
Dynamo and switchboard men	154	19	73	47	15	.....	.....	.....	.....	34	23	37	15	30	1	2	.....	1	11
Engineers	29	5	14	6	4	.....	.....	.....	.....	2	.....	.....	2	4	3	4	1	2	11
Mechanics	2015	23	1221	771	.....	9	4	66	84	155	389	400	185	380	124	137	40	31	11
Draughtsmen	13	.....	3	10	.....	.....	.....	1	.....	1	.....	5	1	1	2	.....	1	1	.....
Civil engineers	55	26	29	.....	.....	.....	.....	1	11	11	5	5	6	5	2	8	.....	.....	1
Painters	67	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	11	12	12	14	8	6	1	.....
Car cleaners	120	.....	67	.....	.....	.....	8	.....	.....	57	15	14	2	23	.....	1	.....	.....	.....
Stevedores	137	.....	110	.....	27	.....	.....	.....	27	.....	.....	.....	72	3	.....	.....	.....	12	23
Miscellaneous	261	59	39	144	19	25	13	58	12	61	27	23	8	5	3	2	8	1	15
Totals	14372	687	5955	7660	70	217	1739	778	526	959	1359	2944	1847	1984	591	506	321	249	352

TABLE VI. Wages Paid in Telephone Companies.

Occupations.	Number of employees considered	Wages per month.														
		$20.00 and under	Over $20.00 to $25.00	Over $25.00 to $30.00	Over $30.00 to $35.00	Over $35.00 to $40.00	Over $40.00 to $45.00	Over $45.00 to $50.00	Over $50.00 to $55.00	Over $55.00 to $60.00	Over $60.00 to $70.00	Over $70.00 to $80.00	Over $80.00 to $90.00	Over $90.00 to $100.00	Over $100.00 to $125.00	Over $125.00
Males—																
Adjusters	40											11	19	7	3	
Agents	61			1		1			1		1	57				
Cable splicers	295				1				8	45	73	30	8	16	114	
Canvassers	36			1						1	7	15	7	3	2	
Clerks	565			12	4	26	8	26	37	30	106	149	83	43	41	
Collectors	212			10	2	7	11	15	5	8	66	27	23	16	22	
Engineering department	53										1	6	11	12	23	
Foremen	373											4	1	16	352	
Inspectors	64							1					10	43	10	
Installers	481								6	6	84	31	10	314	30	
Janitors	15			2			1	4	4	1	1	1		1		
Laborers	1059			28	1	12	1	2	232	295	398	51	2	15	22	
Linemen	567							1	1		15	18	26	482	24	
Managers	107					1		12	4	3	4	8	10	14	23	28
Messengers	73			68	4	1										
Repairmen	220			2	4	24	2	5	17	4	6	12	19	120	5	
Storekeepers	8								1		1	4	1	1		
Switchboard men	257					3		4	5	7	37	19	33	108	41	
Switchboard men, helpers	23				1		1		3	2	2	13		1		
Testers	68							2	3	10	13	17	2	16	5	
Wire chiefs	72											3	4	22	43	
General helpers	50								5	6	9	28			2	
Miscellaneous	324			28	2	11	5	19	31	24	31	26	23	38	86	
Totals	5023			152	19	86	29	91	363	442	855	530	292	1288	848	28

Females—																
Clerks	400			50	100	69	57	59	29	10	16	5	4	1		
Managers	2														2	
Matrons	1								1							
Operators, chief	167			21	21	28	17	18	12	10	18	16	5	1		
Operators	2942		1	1495	374	413	328	186	70	25	38	9	1	1	1	
Recorders	1														1	
Stenographers	179			7	16	28	8	29	23	20	20	7	5	1	1	
Miscellaneous	57			27	10	4	22	1	2	2		3				
Totals	3749		1	1600	521	542	432	293	137	67	92	40	15	4	5	
Males and Females—																
Totals	8772		1	1752	540	628	461	384	500	509	947	570	307	1292	853	28

ORGANIZED LABOR

TABLE I. Building Trades and Affiliating Organizations in the State of California—1909-10.

Trade and location.	Membership of union reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Asbestos Workers.						
San Francisco	25	Asbestos workers	8	Day	$4 00	$4 00
Bricklayers and Masons.						
Bakersfield	42	Bricklayers	8	Hour	75	75
Long Beach	23	Bricklayers	8	Hour	75	75
Los Angeles	170	Bricklayers	8	Day	†	5 00
Oakland	146	Bricklayers	8	Hour	87½	87½
Pasadena	31	Bricklayers	8	Hour	62½	68¾
Sacramento	38	Bricklayers	8	Day	7 00	7 00
San Diego	30	Bricklayers	8	Day	6 00	6 00
San Francisco	100	Bricklayers	8	Day	7 00	7 00
San Jose	18	Bricklayers	8	Day	6 00	6 00
Stockton	26	Bricklayers	8	Day	6 00	6 00
Bridge and Structural Iron Workers.						
Los Angeles	63	Structural iron workers	8	Day	2 50	3 00
San Francisco	500	Structural iron workers	8	Hour	62½	†
San Francisco	600	Housesmiths, shop	9	Day	4 00	4 00
		Housesmiths, outside	8	Day	5 00	5 00
		Housesmiths, apprentices	8 to 9	Day	3 00	3 00
San Francisco	†	Pile drivers	8	Day	†	4 00
		Bridge builders	8	Day	†	4 50
Carpenters and Joiners.						
Alameda	132	Carpenters	8	Day	†	4 00
Bakersfield	160	Carpenters	8	Day	4 00	4 00
Berkeley (3 unions)	395	Carpenters	8	Day	4 00	4 00
Elmhurst	52	Carpenters	8	Day	3 00	4 00
Eureka	75	Carpenters	8	Day	4 00	†
		Millmen	8	Day	3 25	†
Fresno	160	Carpenters	8	Day	4 00	4 00
Gilroy	16	Carpenters	8	Day	3 50	3 50

Hayward	36	Carpenters and millmen	8	Day	4 00	4 00
Lindsay	24	Carpenters	8	Day	3 50	3 50
Lodi	50	Carpenters and millmen	8	Day	3 00	3 50
Long Beach	69	Carpenters	8	Day	3 50	3 50
Los Angeles (3 unions)	171	Carpenters	8	Day	†	3 50
Mill Valley	75	Carpenters	8	Day	5 00	5 00
Mountain View	25	Carpenters	8	Day	4 80	4 80
Oakland (4 unions)	1348	Carpenters	8	Day	4 00	4 00
Oakland	650	Millmen	8	Day	3 25 to 5 00	†
Oroville	55	Carpenters	8	Day	3 00	4 00
Pacific Grove	43	Carpenters and millmen	8	Day	4 00	4 00
Palo Alto	117	Carpenters	8	Day	4 80	4 80
Redlands	70	Carpenters	8	Day	3 50	3 50
Redwood City	52	Carpenters	8	Day	4 00	†
Sacramento	550	Carpenters	8	Day	4 00	†
Sacramento	140	Mill hands	8	Day	3 00 to 4 00	†
San Diego	285	Carpenters	8	Day	3 50	3 50
San Francisco (10 unions)	5501	Carpenters	8	Day	5 00	5 00
San Francisco	550	Cabinetmakers	8	Day	4 50	4 50
		Machine hands	8	Day	3 25	4 00
San Francisco	56	Millwrights	8	Day	†	5 00
San Francisco	77	Stairbuilders	8	Day	5 50	5 50
San Jose	325	Carpenters	8	Day	4 80	4 80
San Jose	438	Millmen	8	Day	3 25 to 5 00	3 25 to 5 00
San Luis Obispo	30	Carpenters	8	Day	3 00	3 00 to 3 50
San Mateo	195	Carpenters and millmen	8	Day	5 00	5 00
San Pedro	†	Carpenters	8	Day	3 50	3 50 to 4 50
Santa Barbara	15	Carpenters	8	Day	3 50	3 50
Santa Rosa	85	Carpenters	8	Day	4 00	4 00
Stockton	300	Carpenters	8	Day	4 00	4 00 to 4 50
Sunnyvale	16	Carpenters	8	Day	4 50	†
Vallejo	116	Carpenters	8	Day	4 50	†
Visalia	74	Carpenters	8	Day	3 50	3 50
Watsonville	67	Carpenters and millmen	8	Day	4 50	†
Carpet and Shade Workers.						
San Francisco	132	Carpet and shade workers	9	Day	5 00	5 00
Cement Workers.						
Los Angeles	79	Finishers	8	Day	4 50	5 00
		Finishers, helpers	8	Day	3 50	4 00
		Laborers	8	Day	2 50	2 75
Sacramento	120	Cement workers	8	Day	5 00	5 00
San Francisco	865	Finishers	8	Day	6 00	6 00
San Francisco		Finishers, helpers	8	Day	$4 00	$4 00

†Not stated.

TABLE I. Building Trades and Affiliating Organizations in the State of California, 1909-10—Continued.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Electrical Workers.						
Fresno	44	Linemen, electric light	8	Day	$3 00	$3 50
		Linemen, telephone	8	Day	2 00	3 50
		Wiremen	8	Day	2 50	3 50
Los Angeles	27	Electrical workers	8	Day	3 00	3 50
Los Angeles	104	Inside wiremen	8	Day	3 50	†
Los Angeles	60	Inside wiremen, telephone	8	Day	2 50	3 50
Los Angeles	180	Linemen	8	Day	3 50	3 50
		Cable splicers	8	Day	4 00	4 00
Oakland	350	Electrical workers	8	Day	3 75	4 00
Oakland (2 unions)	255	Inside wiremen	8	Day	5 00	5 00
		Inside wiremen, apprentices	8	Day	1 50 to 3 00	1 50 to 3 00
Pasadena	56	Linemen	8	Day	3 25	3 50
Sacramento	325	Construction men	8	Month	75 00	95 00
		Linemen	8	Day	3 50	4 00
San Bernardino	59	Electrical workers	8 to 9	Day	3 50	3 60
San Diego	113	Inside wiremen	8 to 9	Day	3 00	3 00
		Linemen	8 to 9	Day	3 50	3 50
San Francisco	109	Assemblers and installers	8	Day	4 50	†
San Francisco	400	Electrical workers	8	Day	3 50	4 00
San Francisco (2 unions)	925	Wiremen	8	Day	5 00	5 00
		Wiremen, aprentices	8	Day	2 00 to 4 00	2 00 to 4 00
San Jose	120	Inside wiremen	8	Day	4 00	4 00
		Linemen	8	Day	3 50 to 4 00	3 50 to 4 00
Santa Barbara	34	Inside wiremen	8	Day	3 50	†
Stockton	25	Inside wiremen	8	Day	4 00	4 00
Vallejo	72	Electrical workers	8	Day	4 00	4 00
Elevator Constructors.						
San Francisco	145	Elevator constructors	8	Hour	37½	62½

Elevator Conductors and Starters.						
San Francisco	200	Elevator conductors	9	Month	70 00	75 00
		Elevator starters	9	Month	80 00	80 00
Engineers, Stationary.						
Oakland	196	Stationary engineers	8	Day	3 50	4 00
		Hoisting engineers	8	Day	6 00	6 00
Sacramento	17	Stationary engineers	8	Day	3 75	3 75
San Francisco	189	Stationary engineers	8	Day	5 00	6 00
San Jose	65	Stationary engineers	8	Day	3 50	5 00
San Pedro	8	Stationary engineers	9	Day	3 00	3 00
Stockton	22	Stationary engineers	8	Day	3 00	3 00
Excavators, Street Concrete, and Asphalt Workers.						
San Francisco	500	Excavators, street concrete, and asphalt workers	8	Day	2 50	2 50
Firemen, Stationary.						
San Francisco	241	Stationary firemen	8	Day	2 75	3 00 to 3 25
Vallejo	12	Stationary firemen	8	Day	3 28	3 28
Hod Carriers.						
Sacramento	61	Hod carriers	8	Day	4 00	4 00
San Francisco	700	Hod carriers	8½	Day	5 00	5 00
Stockton	31	Hod carriers	8	Day	4 00	4 00
House Razers and Movers.						
Sacramento	12	House razers and movers	8	Day	4 00	†
San Francisco	65	House razers and movers	8	Day	5 00	5 00
Iron, Steel, and Tin Workers.						
Oakland	54	Iron and steel workers	†	Piece work		
Lathers.						
Fresno	7	Lathers	8	Piece work		
Los Angeles	92	Lathers	8	Piece work		
Oakland	80	Lathers	8	Piece work		
Sacramento	32	Lathers	8	Day	6 00	6 00
San Francisco	300	Lathers	8	Day	6 00	6 00
San Jose	20	Lathers	8	Piece work		
San Rafael	12	Lathers	8	Piece work		4 00 av. per day.

†Not stated.

TABLE I. Building Trades and Affiliating Organiz ations in the State of California, 1909-10—Continued.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Marble and Stone Workers.						
Los Angeles	12	Marble cutters and setters	8	Day	$4 50	$4 50
Los Angeles	85	Stone cutters	8	Day	†	4 50
San Francisco	230	Marble workers	8	Day	3 50 to 5 00	3 50 to 5 00
San Francisco	150	Marble cutters, helpers	8	Day	3 00	3 00
San Francisco	182	Stone cutters	8	Day	5 00	5 00
San Francisco	15	Stone sawyers	10	Day	5 00	5 00
San Francisco	150	Mosaic and terrazo workers	8	Day	4 00	†
		Mosaic and terrazo workers, helpers	8	Day	3 00	†
Metal Polishers.						
San Francisco	42	Brass finishers	8½	Day	3 50	3 50
		Chandelier workers	9	Day	4 00	4 00
Metal Workers, Sheet.						
Los Angeles	17	Coppersmiths, tinners, and pipe fitters	9	Hour	37½	37½
Los Angeles	99	Sheet metal workers	8	Day	4 00	4 00
Sacramento	38	Sheet metal workers	8	Day	4 00	4 50
San Diego	23	Sheet metal workers	8	Day	4 00	4 00
San Francisco	540	Sheet metal workers	8	Day	5 50	5 50
San Jose	27	Sheet metal workers	8	Day	4 50	5 00
Painters, Paper hangers, and Decorators.						
Eureka	32	Painters and paper hangers	8	Day	3 50	4 00
Fresno	79	Painters and paper hangers	8	Day	4 00	†
Gilroy	10	Painters and paper hangers	8	Day	4 00	†
Los Angeles	42	Painters and paper hangers	8	Day	3 00	3 00
Los Angeles	40	Sign painters	8	Day	4 50	5 00
Los Gatos	14	Painters and paper hangers	8	Day	3 50	3 50
Monterey	26	Painters and paper hangers	8	Day	4 00	4 00
Oakland	600	Painters and paper hangers	8	Day	4 50	4 50
Oakland	50	Carriage painters	8	Day	3 00 to 4 00	3 00 to 4 00

Oakland	-----	Pictorial painters	8	Day	6 50	†
		Sign painters	8	Day	5 30	†
Pasadena	36	Painters and paper hangers	8	Day	3 50 to 4 00	3 50 to 4 00
Riverside	22	Painters	8	Day	†	3 00
Sacramento	208	Painters and paper hangers	8	Day	4 00	4 00
San Francisco	1600	Painters and paper hangers	8	Day	4 50 to 5 00	4 50 to 5 00
San Francisco	140	Sign and pictorial painters	8	Day	5 50	5 50 to 6 50
San Jose	140	Painters and paper hangers	8	Day	4 00	†
San Mateo	66	Painters and paper hangers	8	Day	4 50	4 50
San Rafael	45	Painters and paper hangers	8	Day	4 50	4 50
Santa Barbara	15	Painters	8	Day	3 50	3 50
Santa Cruz	12	Painters and paper hangers	8	Day	4 00	4 00
Santa Rosa	21	Painters and paper hangers	8	Day	3 50	†
Stockton	81	Painters and paper hangers	8	Day	4 00	4 00
Vallejo	60	Painters and paper hangers	8	Day	4 00	4 00
Plasterers.						
Oakland	126	Plasterers	8	Day	7 00	7 00
Sacramento	70	Plasterers	8	Day	7 00	7 00
San Rafael	25	Plasterers and bricklayers	8	Day	7 00	7 00
Plumbers, Gas Fitters, and Steam Fitters.						
Fresno	27	Plumbers and steam fitters	8	Day	3 50 to 5 00	5 00
Los Angeles	150	Plumbers	8	Day	4 50	4 50
Oakland	140	Plumbers, gas, and steam fitters	8	Day	†	6 00
Redlands	32	Plumbers	8	Day	†	5 00
Richmond	47	Steam fitters	8	Day	4 00	†
		Steam fitters, helpers	8	Day	2 75	†
Sacramento	65	Plumbers	8	Day	5 50	5 50
San Francisco	600	Plumbers, gas, and steam fitters	8	Day	6 00	6 00
San Jose	51	Plumbers	8	Day	5 00	5 00
San Rafael	19	Plumbers	8	Day	3 50	5 00
Santa Rosa	16	Plumbers	8	Day	4 00	4 00
Stockton	24	Plumbers	8	Day	4 50	†
Vallejo	28	Plumbers, gas, and steam fitters	8	Day	5 00	†
Roofers.						
Oakland	17	Roofers (felt and composition)	8	Day	5 00	5 00
San Francisco	101	Roofers (felt and composition)	8	Day	6 00	7 50
Shinglers.						
Oakland	50	Shinglers	8			5 00 av. per day.
San Francisco	50	Shinglers	8	Piece work		5 00 av. per day.

†Not stated

TABLE II. Organizations Other Than Buildin g Trades in the State of California—1909-10.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Bakers and Confectioners.						
Fresno	37	Bakers, bread and cake	10	Week	$18 00 to 35 00	†
Los Angeles	90	Bakers, bread and cake		Day	3 00 to 4 00	†
Oakland	156	Bakers	9	Week	21 00	$21 00
Sacramento	110	Bakers	9	Week	20 00	†
		Foremen	9	Week	25 00	†
San Francisco	760	Bakers	9	Week	20 00	20 00
San Francisco	65	Bakers, cracker	9	Day	2 25	4 00
San Francisco	13	Bakers, pie	8	Week	18 00	18 00
San Francisco	100	Salesmen	11	Week	21 00	21 00
Barbers.						
Bakersfield	44	Barbers	11	Week	18 00	18 00
Eureka	30	Barbers	8 to 9	Week	18 00	18 00
Hanford	6	Barbers	12		Percentage	
Los Angeles (2 unions)	496	Barbers	12	Week	14 00	14 00
Richmond	10	Barbers	11	Week	18 00	20 00
Riverside	7	Barbers	11	Week	15 00	15 00
San Bernardino	40	Barbers	12	Week	15 00	15 00
San Diego	63	Barbers	12	Week	12 00	15 00
San Francisco	635	Barbers	10½	Week	16 00	16 00
San Jose	83	Barbers	11½	Week	12 00	12 00
Santa Barbara	10	Barbers	11	Week	†	15 00
Santa Rosa	21	Barbers	10	Week	15 00	16 00
Vallejo	42	Barbers	12½	Week	16 00	20 00
Blacksmiths and Helpers.						
Sacramento	170	Blacksmiths	9	Hour	32½	40
San Francisco	110	Blacksmiths	8½	Day	4 00	4 50
Boilermakers and Iron Ship Builders.						
Los Angeles	72	Boiler makers	9	Hour	45½	45½
Sacramento	105	Boiler makers	9	Hour	45½	54½
San Francisco	100	Iron ship builders	8½	Day	4 00	4 00

Bookbinders.						
Sacramento	40	Bookbinders	8	Day	3 50	4 00
San Francisco	209	Bookbinders	8	Day	3 50	3 50
San Francisco	285	Bindery girls	8	Week	10 00	10 00
Boot and Shoe Workers.						
Oakland	40	Boot and shoe workers	10	Week	15 00	15 00
Petaluma	50	Boot and shoe workers‡	9	Piece work		1 00 to 6 00 per day.
San Francisco	240	Boot and shoe workers	9	†	†	†
San Francisco	33	Boot and shoe cutters	9	Week	18 00	20 00
Brewery Workmen.						
San Francisco	571	Brewers and maltsters	8	Day	4 00	4 00
San Francisco	280	Beer bottlers	8	Week	16 50	18 00
Cigarmakers.						
Bakersfield	33	Cigar makers	8	Piece work		19 00 av. per week
Eureka	26	Cigar makers	8	Piece work		15 00 av. per week
San Diego	50	Cigar makers	8	Piece work		15 00 av. per week
San Francisco	370	Cigar makers	8	Piece work		18 00 av. per week
San Jose	40	Cigar makers	8	Week	13 50	13 50
Clerks.						
Oakland	75	Shoe clerks	9	Week	†	†
San Francisco	240	Drug clerks	10 to 14	Month	100 00	100 00
San Francisco	52	Grocery clerks	11	Week	None	16 00 to 21 00
San Francisco (2 unions)	461	Postoffice clerks‡	8 to 9	Year	600 00 to	1200 00
San Francisco	120	Retail clerks	9	Week	15 00	20 00
San Luis Obispo	13	Retail clerks	9	†	†	†
San Rafael	23	Retail clerks (dry goods and grocery)	10	Month	40 00	65 00
Vallejo	60	Retail clerks*	9	Month	35 00	†
		Retail clerks	9	Month	80 00	†
Coopers.						
Fresno	6	Coopers	9	Day	4 00	4 00
Los Angeles	30	Coopers	8	Day	4 00	4 00
San Francisco	200	Coopers	9	Day	4 00	†

*Female. ‡Both sexes. †Not stated.

TABLE II. Organizations Other Than Building Trades in the State of California, 1909-10—Continued.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Engineers and Firemen, Locomotive.						
Dunsmuir	101	Locomotive engineers			Mileage basis	
Kern	147	Locomotive engineers			Mileage basis	
Los Angeles	85	Locomotive engineers			Mileage basis	
Oakland (2 unions)	470	Locomotive engineers			Mileage basis	
		Locomotive firemen			Mileage basis	
Sacramento	100	Locomotive engineers			Mileage basis	
San Francisco	120	Locomotive firemen			Mileage basis	
Engineers, Marine.						
San Francisco	1300	Marine engineers		Month	$70 00 to 130 00	
Engineers, Steam.						
Los Angeles	65	Steam engineers, brewery	8	Day	4 00	$4 00
		Steam engineers, laundry	8	Day	3 50	3 50
		Steam engineers, miscellaneous	10 to 12	Day	2 50	3 00
San Francisco	445	Steam engineers	8½	Month	90 00	110 00
Garment Workers.						
Los Angeles	325	Garment workers‡	8	Piece work		2 50 av. per day.
Gas Workers.						
Oakland	140	Gas workers	8	Day	2 50 to 4 00	2 50 to 4 00
Sacramento	63	Gas makers	8	Month	100 00	100 00
		Gas workers	8	Day	2 50 to 3 50	2 50 to 3 50
		Meter men	8	Month	80 00	90 00
San Francisco	325	Gas workers	8	Day	2 50	3 25
Horseshoers.						
Oakland	29	Horseshoers	9	Day	4 00	4 00
San Francisco	98	Horseshoers	9	Day	5 00	5 00

Hotel and Restaurant Employees, and Bartenders.						
Bakersfield	161	Bartenders	10	Week	20 00	21 00
Los Angeles	280	Bartenders	10	Week	18 00	21 00
Los Angeles	115	Cooks	11	Week	16 00	20 00
Los Angeles	240	Waiters	10	Week	10 00	10 00
Oakland	100	Bartenders	10	Week	18 00 to 25 00	18 00 to 25 00
Oakland	350	Cooks	10	Week	15 00 to 27 50	15 00 to 27 50
Oakland		Waiters	10	Week	10 00 to 12 00	10 00 to 12 00
		Waitresses	10	Week	10 00	10 00
San Diego	75	Bartenders	10	Week	15 00	18 00
San Francisco	800	Bartenders	10	Week	18 00	22 50
				Month	75 00	75 00
San Francisco	550	Cooks	10½	Week	18 00	18 00
San Francisco	403	Cooks, hotel, and restaurant butchers	10½	Week	18 00	22 50
San Francisco	1000	Waiters	10	Week	12 00	12 00
San Jose	140	Bartenders	10	†	†	†
Laundry Workers.						
Los Angeles	300	Laundry workers‡	9	Week	7 00 to 18 00	7 00 to 18 00
San Francisco	1400	Laundry workers‡	49 week	Week	7 00 to 18 00	7 00 to 18 00
San Jose	51	Laundry workers‡	8	Week	6 00 to 15 00	10 00 to 18 00
Leather Workers.						
Los Angeles	36	Leather workers on horse goods	9	Piece work		2 50 av. per day.
Los Angeles	31	Leather workers on trunks and cases	8¾	Day	2 50 to 3 00	2 50 to 3 50
San Francisco	105	Leather workers on horse goods	9	Piece work		3 50 to 3 75 av. day.
San Francisco	†	Tanners	9	Day	2 00	2 50
San Jose	12	Leather workers on horse goods	9	Day	2 75	†
Longshoremen.						
Oakland	230	Lumber handlers	9	Hour		8 00 to 25 00 av. wk.
San Francisco	600	Lumber handlers	9	Hour	50	50
San Pedro	120	Longshoremen	9	Hour	†	†
Stockton	70	Lumber handlers	9	Day	3 00	3 00

†Not stated.

TABLE II. Organizations Other Than Building Trades in the State of California, 1909-10—Continued.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Machinists.						
Dunsmuir	52	Machinists, railroad	9	Hour	$0 43	$0 43
Los Angeles	320	Machinists, contract	9½	Hour	32	35
		Machinists, railroad	9	Hour	43	43
Oakland	650	Machinists	8¼	Day	3 50	3 75
Oakland	144	Machinists, railroad	9	Hour	43	43
Sacramento	200	Machinists, railroad	9	Hour	43	43
San Diego	32	Machinists	9	Day	3 25	3 75
San Francisco	1400	Machinists	9	Day	3 50	3 75
		Machinists, railroad	8¼	Hour	43	43
San Francisco	125	Machinists, apprentices, 1st year	8½	Week	4 00	
		Machinists, apprentices, 2d year	8½	Week	5 00	
		Machinists, apprentices, 3d year	8½	Week	6 00	
		Machinists, apprentices, 4th year	8½	Week	7 00	
San Francisco	50	Machine hands	8½	Day	$2 75	$2 75 to $3 50
San Jose	34	Machinists	8	Day	3 50	†
Vallejo	200	Machinists	8	Hour	52	52
Meat Cutters and Butchers.						
Bakersfield	35	Meat cutters and butchers	10	Week	18 00	20 00
		Delivery men	10	Week	15 00	15 00
San Francisco	680	Meat cutters and butchers	10	Week	20 00	†
Miners.						
Big Oak Flat	8	Miners	8	Day	3 00	3 00
Bodie	80	Miners	8	Day	4 00	4 00
Delamar	150	Miners	8	Day	3 00	3 00
Grass Valley	580	Miners	8	Day	2 00	3 00
Randsburg	97	Miners	8	Day	3 50	3 50
Mojave	69	Millmen	8	Day	4 00 to 4 50	4 00 to 4 50
		Miners	8	Day	3 00	3 00
Stent	4	Millmen	8	Day	4 00	4 00
		Miners	8	Day	2 50	2 50

Molders.						
Newark	36	Iron molders	10	Day	4 00	†
San Francisco	750	Iron and brass molders	8½	Day	4 00	4 00
Musicians.						
Bakersfield	50	Musicians‡				
Eureka	22	Musicians‡				
Fresno	67	Musicians‡				
Los Angeles	535	Musicians‡				
Oakland	325	Musicians‡				
San Diego	100	Musicians‡				
San Francisco	1185	Musicians‡				
San Jose	120	Musicians‡				
Stockton	101	Musicians‡				
Paving Cutters.						
Santa Rosa	125	Paving cutters	9	Piece work		
Victorville	7	Paving cutters	8	Piece work		
Photo Engravers.						
Los Angeles	38	Photo engravers	8 to 9	Week	18 00	†
San Francisco	130	Photo engravers	8	Week	24 00	26 00
Printing Pressmen.						
Los Angeles	70	Pressmen	8	Week	15 00	18 00
Los Angeles	48	Web pressmen	8	Day	3 50	†
Los Angeles	60	Pressfeeders	8	Week	13 50	15 00
Oakland	82	Pressmen	8	Week	20 00 to 30 00	†
		Pressmen, apprentices	8	Week	18 00	†
		Pressfeeders‡	8	Week	12 00 to 15 00	†
Sacramento	58	Pressmen	8	Week	18 00 to 24 00	†
		Pressfeeders	8	Week	7 00 to 12 00	†
San Francisco	306	Pressmen	8	Day	3 50	5 00
San Francisco	120	Web pressmen	8	Week		
San Francisco	210	Pressfeeders	8	Week	12 00	15 00
San Jose	27	Pressmen	8	Week	18 00	21 00 to 28 00
		Pressmen, apprentices	8	Week	9 00	9 00
Railroad Trainmen.						
Bakersfield	125	Railroad trainmen	8 to 10			
Eureka	42	Conductors and brakemen	10			
Fresno	97	Conductors and brakemen	10			
Los Angeles	435	Railroad trainmen	†			
Los Angeles	87	Switchmen	10	Hour	†	37
Oakland	550	Railroad trainmen	†			
San Bernardino	102	Conductors and brakemen	10			

†Not stated.

TABLE II. Organizations Other Than Building Trades in the State of California, 1909-10—Continued.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Railroad Trainmen—Continued.						
San Francisco	131	Railroad trainmen	6 to 12			
San Francisco	107	Railroad yardmen	10			
San Jose	46	Switchmen	10 to 12			
Railway Conductors.						
Fresno	70	Conductors and brakemen	10			
Los Angeles	155	Conductors	†			
Needles	96	Conductors	12			
Sacramento	124	Conductors	8			
San Luis Obispo	47	Conductors	8			
Riggers and Stevedores.						
San Francisco	1800	Riggers and stevedores	9	Hour	$0 50	†
		Riggers and stevedores, lumber	9	Hour	55	†
San Francisco	20	Riggers	8	Day	†	$5 00
Street and Electric Railway Employees.						
Oakland	800	Motormen and conductors	10	Hour	30 to 42	30 to 42
Richmond	32	Motormen and conductors	10	Hour	27	27
Sacramento	165	Motormen and conductors	9 to 10	Hour	27 to 30	†
Stockton	82	Motormen and conductors	8 to 9½	Hour	25	25
Seamen.						
San Francisco	†	Seamen, sail		Month	†	45 00
San Francisco (Pacific Coast)		Seamen, steam		Month	†	50 00
San Francisco (Pacific Coast)	2200	Fishermen		Season		400 00 av. per season.§
San Francisco (Pacific Coast)	2300	Marine firemen and water tenders	9	Month	55 00	†
San Francisco (Pacific Coast)		Marine oilers	9	Month	45 00	†
San Francisco (Pacific Coast)	1200	Marine cooks and stewards, cooks	12	Month	60 00	70 00
San Francisco (Pacific Coast)		Marine cooks and stewards, waiters	12	Month	30 00	30 00

Shipwrights, Joiners and Calkers.						
San Francisco	138	Ship calkers	8	Day	5 00	5 00
San Francisco	62	Ship joiners	8	Day	5 00	5 00
San Francisco	125	Shipwrights	8	Day	5 00	5 00
Stage Employees.						
Los Angeles	72	Stage employees	8	Day	2 50	†
Oakland	37	Stage employees	8	Hour	65	65
San Francisco	155	Stage employees	†	Week	30 00 to 35 00	30 00 to 35 00
Stereotypers and Electrotypers.						
San Francisco	93	Stereotypers and electrotypers	8	Day	4 50	†
Tailors.						
Bakersfield	8	Tailors	10	Piece work		
Los Angeles	150	Tailors and finishers‡	9	Piece work		20 00 av. per wk.
San Francisco	325	Tailors	9	Piece work		22 50 av. per wk.
		Finishers*	9	Piece work		15 00 av. per wk.
San Francisco	50	Tailors, ladies'	8	Week	24 00	24 00
San Jose	37	Tailors	10	Piece work		
		Bushelmen	9	Week	21 50	21 50
		Finishers*	9	Week	10 00	†
Stockton	30	Tailors	10	Piece work		
Teamsters.						
Los Angeles	125	Teamsters	12	Day	2 00	2 25
Oakland	24	Ice wagon drivers	10 to 12	Month	†	†
Oakland	120	Milk wagon drivers	9	Month	90 00	†
Oakland	275	Teamsters	11	Day	3 00	3 00 to 4 00
Sacramento	106	Building material teamsters	9	Day	2 50	3 00
San Francisco	350	Beer wagon drivers, and stablemen	10	Week	21 00	28 00
San Francisco	500	Building material teamsters	12	Day	3 00	4 00
San Francisco	204	Hackmen	11 to 12	Day	2 50	2 50 to 3 00
San Francisco	87	Ice wagon drivers	10 to 11	Month	95 00	95 00
		Ice wagon drivers, helpers	10 to 11	Day	3 00	3 00
San Francisco	245	Laundry wagon drivers	Commission.			75 00 av. per mo.
San Francisco	300	Milk wagon drivers	10	Month	75 00	90 00
San Francisco	160	Retail delivery wagons	10	Day	2 50	3 00
San Francisco	240	Stablemen	12	Week	21 00	21 00
San Francisco	1800	Teamsters	11	Day	2 00	2 00 to 4 00
San Jose	125	Teamsters	9	Day	3 00	3 00
San Rafael	53	Teamsters	8	Day	2 75	3 00
Santa Rosa	18	Teamsters	10	†	†	†
Stockton	55	Teamsters	10	Day	2 50	2 50 to 3 00

*Female. †Not stated. ‡About 5½ months.

TABLE II. Organizations Other Than Building Trades in the State of California, 1909-10—Continued.

Trade and location.	Membership of unions reporting.	Occupation.	Hours per day.	Wages.		
				Unit.	Minimum rate.	Ruling rate.
Telegraphers.						
Oakland	2000	Railroad telegraphers‡	9 to 12	Month	$75 25	$75 25
Typographical Union.						
Chico	15	Compositors	8	Day	2 50	2 50 to 3 50
		Linotype operators	8	Day	4 00	4 00 to 5 00
Eureka	22	Job printers	8	Day	3 00	3 50
		Machine men	8	Day	4 00 to 4 50	4 50
		Newspaper printers	8	Day	3 00 to 3 50	3 50
Fresno	55	Job printers	8	Day	3 50	†
		Newspaper printers, day‡	7½	Day	4 00	†
		Newspapers printers, night	7½	Day	4 50	†
Los Angeles	321	Job printers	8	Week	$20 00	†
		Newspaper printers, day‡	8	Week	27 00	†
		Newspaper printers, night	8	Week	30 00	†
Marysville	11	Job printers	8	Week	15 00	$15 00
		Newspaper printers, day	8	Week	24 00	24 00
		Newspaper printers, night	8	Week	24 00	27 00
Nevada City and Grass Valley	14	Job printers	8	Day	2 50 to 4 00	2 50 to 4 00
		Newspaper printers	8	Day	2 50 to 3 50	3 00 to 4 50
Oakland	145	Job printers	8	Day	4 50	4 50
		Machine men	7½	Day	5 00	5 00
		Newspaper printers	7½	Day	4 50	4 50
Palo Alto	15	Job printers	8	Week	18 00 to 24 00	18 00 to 24 00
		Newspaper printers	8	Day	4 50	4 50
Pasadena	37	Compositors	8	Day	3 60	4 00
Richmond, and Contra Costa Co.	15	Compositors	8	Week	19 00 to 24 00	19 00 to 24 00
Riverside	22	Compositors‡	8	Week	18 00	18 00 to 25 50
Sacramento	145	Job printers	8	Week	22 50	†
		Newspaper printers, day	8	Week	22 50 to 27 50	†
		Newspaper printers, night	8	Week	21 00 to 27 00	†
San Bernardino	29	Compositors	8	Week	18 00	20 00 to 24 00
San Diego	76	Job printers	8	Day	4 00	†
		Newspaper printers, day	8	Day	4 00	†
		Newspaper printers, night	8	Day	4 50	†

San Francisco	925	Compositors‡	7½ to 8	Day	4 00 to 5 33	4 00 to 5 33
San Francisco	72	Mailers	7½	Day	3 41⅔	3 41⅔
San Jose	88	Job printers	7½ to 8	Day	3 50 to 4 00	3 50 to 4 00
		Newspaper printers, day	7½ to 8	Day	4 00	4 00
		Newspaper printers, night	7½ to 8	Day	4 50	4 50
San Luis Obispo	11	Compositors‡	8	Day	2 50	2 50
San Mateo	12	Compositors	8	Week	18 00	18 00
Santa Rosa	20	Compositors	8	Week	18 00	18 00
Stockton	36	Newspaper printers, day	8	Day	3 75 to 4 25	3 75 to 4 25
		Newspaper printers, night	8	Day	4 25 to 4 75	4 25 to 4 75
Visalia	13	Compositors	9	Week	18 00	†
Woodworkers.						
Oakland	30	Boxmakers and sawyers	9	Day	3 00 to 3 25	†
San Francisco	173	Boxmakers and sawyers	9	Day	2 50	3 00
Miscellaneous.						
Los Angeles	28	Art glass workers	8	Day	3 00	3 50
Los Angeles	14	Tile setters	8	Day	4 00	4 00
Ocean View	100	Cemetery workers	8	Day	3 00	†
San Francisco	25	Baggage messengers and transfer men	12	Week	20 00	†
San Francisco	275	Bootblacks	13 to 15	Week	10 00	12 00
San Francisco	65	Casters	8	Day	4 00	4 00
San Francisco	35	Casting chippers	8½	Day	3 00	3 00
San Francisco	50	Furniture handlers	8	Day	3 00	3 00
San Francisco	155	Glass bottle blowers	8½	Piece work		5 00 av. per day
San Francisco	20	Hatters	9	Piece work		22 50 av. per week
San Francisco	60	Metal polishers, buffers, and platers	9	Day	3 50	†
San Francisco	175	Milkers and can washers	10	Month	75 00	75 00
San Francisco	50	Pavers	8	Day	6 00	6 00
San Francisco	40	Rammermen	8	Day	5 00	5 00
San Francisco	182	Pattern makers	8¼	Day	5 00	5 00
San Francisco	40	Shade makers and hangers	8	Day	4 00	4 00
San Francisco	36	Soap makers	9	Day	5 00	5 00
		Soap workers	9	Day	2 50	2 75
		Soap wrappers*	9	Day	1 50	1 50
San Francisco	35	Soda and mineral water bottlers	9	Day	2 50	3 50
San Francisco	150	Sugar workers	10	Day	2 50	†
San Francisco	50	Undertakers	†	Month	80 00	80 00
San Francisco	140	Upholsterers	8	Day	3 50	4 00
San Francisco	30	Waterworks employees	8	Day	2 50	3 25

*Female. ‡Both sexes. †Not stated.

TABLE IV. Employment
(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment	Number of persons given employment in Oakland	Number of persons given employment outside Oakland	Wages per day.										
				$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$3.00	$3.50	$4.00	$5.00 and over
Bakers	8	4	4											
Blacksmiths	12	1	11						1	2	7	1		
Carpenters	13	11	2							7	4	2		
Choremen	7	3	4											
Cooks	42	32	10											
Dairymen	2		2											
Gardeners	12	3	9					1						
Help, general	52	30	22							1	9	10		2
Help, hotel	2	2												
Help, kitchen	51	48	3	1		5								
Laborers	316	121	195	3		19	106	74	50	38		10	1	
Mechanics														
Miners														
Painters	7	6	1							1	5			
Porters	9	7	2			2								
Ranch hands	27	1	26	16	3	1								
Stablemen	4	1	3											
Teamsters	82	15	67		9	1	6	22	39	3				
Waiters	10	7	3											
Totals	656	292	364	20	12	28	112	97	90	52	25	23	1	2

TABLE V. Employment
(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment	Number of persons given employment in Oakland	Number of persons given employment outside Oakland	Wages per day.										
				$1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$3.00	$3.50	$4.00	$5.00 and over
Bakers	1	1												
Blacksmiths	9	3	6							3	5	1		
Carpenters	9	4	5			1				1	4	2	1	
Choremen	15	8	7	1										
Cooks	49	34	15	1						1		1	1	
Dairymen	1		1											
Gardeners	10	8	2	1			1	3						
Help, general	16	10	6					1						
Help, hotel	11	11												
Help, kitchen	70	62	8	5		1		4			1			
Laborers	292	96	196		15	15	63	80	51	37	5	3		1
Mechanics	9	1	8						1		2		2	3
Miners	4		4							2	1	1		
Painters	8	3	5			1					7			
Porters	9	8	1											
Ranch hands	26	1	25	9	1	6		1						
Stablemen	2	1	1											
Teamsters	28	22	6		2	2		2	17	1				
Waiters	26	13	13		1			2		4				
Totals	595	286	309	17	19	26	64	93	69	49	25	8	4	4

Agencies in Oakland.
Occupations, their Wages and Fees, during Month of April, 1909.)

Wages per month.											Fees.							
$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00	$70.00	$75.00 and over	Under $1.00	$1.00	$1.50	$2.00	$2.50	$3.00	$4.00	$5.00	$6.00 and over
1			2		1	3	1						3	2	2		1		
									1					1	7	1			
	2	3				1		1			1	1	2	3					
	2	3				1		1			1	1	2	3					
2		2	5	5	5	4	2	3	2	12		3	4	15	7	10	3		
					2									2					
		4	3	1	2	1							3	5	1	2	1		
1		6	5	6	3	2	2	2	1	2	2	5	9	6	19	10		1	
		1		1									1	1					
2	7	6	9	9	8	3			1			14	18	18		1			
	1	3	10	1							80	40	52	140	1	3			
									1				3	4					
			4		2	1							1	6	2				
		2	3		2						1	9	13	3			1		
					3	1								3		1			
			1	1								7	29	46					
		2	4		3	1							3	5	1	1			
6	10	29	46	24	31	17	5	6	6	14	88	79	146	263	40	33	6	6	

Agencies in Oakland.
Occupations, their Wages and Fees, during Month of April, 1910.)

Wages per month.											Fees.								
$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00	$70.00	$75.00 and over	Under $1.00	$1.00	$1.50	$2.00	$2.50	$3.00	$4.00	$5.00	$6.00 and over
								1						1					
													1	3	2	3			
											1		1	2		5			
2	1	1	9					1				4	4	6		1			
1		2	9	2	3	2	10	3	6	7	5	1	5	11	12	4	1	2	2
				1										1					
			2	1	1		1				5			2	2	1			
	2	5	5	1				2			2	7		5			2		
			3	4	2			1		1			1	7	1	1	1		
2	2	7	19	16	6	5		2			8	21	18	19	1		3		
	1	1	12	4	3		1				62	78	52	92	5	3			
							1				2	2	1	1		3			
													1	1	1	1			
											1	2		5					
		4	4				1						5	3	1				
			3	2	1			1	2			16	5	2		1	2		
			1					1				1	1						
		1	1		1			1				4	16	8					
	2	6	7	2	2						6	2	10	7		1			
5	8	27	75	33	19	7	14	13	8	8	92	138	121	179	25	24	12	2	2

TABLE VI. Employment
(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment.	Number of persons given employment in Sacramento.	Number of persons given employment outside Sacramento.	Wages per day.										
				$1.00.	$1.25.	$1.50.	$1.75.	$2.00.	$2.25.	$2.50.	$3.00.	$3.50.	$4.00.	$5.00 and over.
Bakers	2		2											
Blacksmiths	16	1	15							2	5	5		
Carpenters	15		15							2	3	9	1	
Choremen	2	1	1											
Cooks	54	9	45				1							
Dairymen	43	4	39											
Gardeners														
Help, general	20	2	18		2	1		1	1	6	2	2		
Help, hotel	2		2											
Help, kitchen	22	14	8	1	2									
Laborers	1006	20	986	4	19	79	498	274	119	7				
Mechanics	27	1	26						2		18	1	1	
Miners	18		18								10	8		
Painters	1		1					1						
Porters	6	3	3											
Ranch hands	565	15	550	3	254	108	90	46						
Stablemen	3		3											
Teamsters	108	3	105		6	6		1	73	15	1			
Waiters	6	2	4											
Totals	1916	75	1841	8	283	194	589	323	195	32	39	25	2	

TABLE VII. Employment
(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment.	Number of persons given employment in Stockton.	Number of persons given employment outside Stockton.	Wages per day.										
				$1.00.	$1.25.	$1.50.	$1.75.	$2.00.	$2.25.	$2.50.	$3.00.	$3.50.	$4.00.	$5.00 and over.
Bakers														
Blacksmiths	13	8	5					1		3	1	2		
Carpenters	8	2	6					1			1	2		
Choremen	26	2	24											
Cooks	90	14	76	1	2	1								
Dairymen	22	4	18											
Gardeners	2	1	1					1						
Help, general	36	15	21					1		7				
Help, hotel	1	1												
Help, kitchen	15	10	5	2										
Laborers	90	32	58		7	5	17	12	6	4				
Mechanics	19	7	12	1		2		1	1	1	6			
Miners	1		1							1				
Painters														
Porters	3		3											
Ranch hands	452	5	447		243	72		2						
Stablemen	2	1	1											
Teamsters	98	16	82		29	14		3	6	1				
Waiters	8	5	3	3										
Totals	886	123	763	7	281	94	17	22	13	17	8	4		

Agencies in Sacramento.
Occupations, their Wages and Fees, during Month of April, 1910.)

Wages per month.											Fees.								
$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00	$70.00	$75.00 and over	Under $1.00	$1.00	$1.50	$2.00	$2.50	$3.00	$4.00	$5.00	$6.00 and over
				1	1									1		1			
						3	1						1	8	4	3			
														4	5	6			
			1				1						1	1					
	1	2	1	2	13	7	10	11	2	4	2	1	9	14	12	9	3	4	
				3	34	6							2	37	2	2			
			2	2	1							7	1	7	5				
	2											2							
	1	5	6	6	1						1	15	6						
	1				1	4					1	289	181	533	2				
					1			1	1	2				5	1	19		2	
														15	2	1			
															1				
		5		1								5	1						
1	2	3	25	29	1	1	1	1			75	396	88	4	2				
		1			2							1		2					
			2	2	2							39	27	42					
			2	2	1	1						3	3						
1	7	16	39	48	58	22	13	13	3	6	79	758	320	673	36	41	3	6	

Agencies in Stockton.
Occupations, their Wages and Fees, during Month of April, 1910.)

Wages per month.											Fees.								
$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00	$70.00	$75.00 and over	Under $1.00	$1.00	$1.50	$2.00	$2.50	$3.00	$4.00	$5.00	$6.00 and over
					1	1	1	2		1			1	5	4	3			
				1			1	1	1			1	1	2	2	2			
6	7	7	6								6	11	9						
2	2	6	21	21	15	1	9	9			1	11	31	30	8	7	2		
				5	16			1					5	17					
					1						1		1						
1	2	1	3	1	4	9	3	2	2		1	4	7	13	10	1			
1												1							
1		5	5	2							1	5	7	2					
		8	22		9						4	38	25	21	2				
						3	2	2			1		4	3	8	3			
													1						
		2	1									1	2						
1	1	15	63	33	12		6	4			7	180	242	11	7	1	2	2	
				2									1	1					
	1	1	15	17	11							16	67	13	2				
		2	1	2								4	3	1					
12	13	47	137	84	69	14	22	21	3	1	22	272	407	119	43	17	4	2	

TABLE VIII. Employment

(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment	Number of persons given employment in San Diego	Number of persons given employment outside San Diego	Wages per day. $1.00	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$3.00	$3.50	$4.00	$5.00 and over.
Bakers	2	1	1								1			
Blacksmiths	10		10							5	4	1		
Carpenters	7	3	4							1	5	1		
Choremen	1	1												
Cooks	22	3	19					3						
Dairymen	10	7	3											
Gardeners														
Help, general	8	4	4				4			1				
Help, hotel	4	3	1											
Help, kitchen	14	10	4	1										
Laborers	229	16	213	30	8		5	44	122	9		1		
Mechanics	15	1	14					1		13	1			
Miners														
Painters														
Porters	3	2	1											
Ranch hands	41	4	37	1	2	5				2				
Stablemen	1		1											
Teamsters	14		14						10	2				
Waiters	3		3											
Totals	384	55	329	32	10	5	9	48	132	33	11	3		

TABLE IX. Female Employment

(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment	Number of persons given employment in San Francisco	Number of persons given employment outside San Francisco	Wages $15.00 and under.	$20.00	$25.00
Chambermaids	33	22	11		2	19
Cooks	83	31	52	1	1	12
House girls	61	38	23	1	6	22
Housework, general	73	46	27	3	4	21
Laundry workers	8	1	7			1
Linen workers	1		1			
Nurse girls	16	9	7		1	1
Saleswomen	16	16				
Waitresses	126	45	81	2		44
Totals	417	208	209	7	14	120

Agencies in San Diego.

Occupations, their Wages and Fees, during Month of April, 1910.)

Wages per month.											Fees.							
$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00	$70.00	$75.00 and over	Under $1.00	$1.00	$1.50	$2.00	$2.50	$3.00	$4.00	$5.00	$6.00 and over
									1						1	1			
													1		5	2		1	1
													1			5		1	
1												1							
			2	1	4	6	3	1	2					2	4	7	7	1	1
2			3	4	1							2			5	2	1		
1		1	1									4		4					
1	2	1											1	3					
	1	2	2	1	4	3								12	1	1			
			5	3		2						3	5	52	154	11	2	2	
														3	12				
1							1	1					1	2					
		2	13	8	3	3	2					1	1	7	10	16	4	2	
							1								1				
					2										11	1	2		
		1	1	1											2	1			
6	3	7	27	18	14	14	7	2	3		11	10	85	206	47	16	7	2	

Agencies in San Francisco.

Occupations, their Wages and Fees, during Month of April, 1909.)

per month.						Fees.								
$30.00	$35.00	$40.00	$45.00	$50.00	$60.00 and over.	$1.00	$1.50	$2.00	$2.50	$3.00	$3.50	$4.00	$5.00 and over.
4	1	5	------	2	------	2	3	20	4	2	------	2	------
11	21	22	------	14	1	3	1	16	7	22	1	19	14
15	13	4	------	------	------	1	7	24	13	14	------	2	------
32	8	2	------	2	1	3	6	21	29	9	------	2	3
3	3	1	------	------	------	------	------	1	3	2	------	1	1
------	------	1	------	------	------	------	------	------	------	1	------	------	------
7	7	------	------	------	------	1	------	2	7	6	------	------	------
1	15	------	------	------	------	------	------	------	15	1	------	------	------
51	27	------	------	2	------	4	8	41	61	12	------	------	------
124	95	35	------	20	2	14	25	125	139	69	1	26	18

TABLE X. Female Employment

(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment.	Number of persons given employment in San Francisco.	Number of persons given employment outside San Francisco.	Wages		
				$15.00 and under.	$20.00.	$25.00.
Chambermaids	44	27	17	------	6	24
Cooks	58	17	41	1	2	4
House girls	58	49	9	1	7	17
Housework, general	47	28	19	1	4	9
Laundry workers	7	3	4	1	------	------
Linen workers	1	1	------	------	------	------
Nurse girls	4	1	3	------	2	------
Saleswomen	16	16	------	------	------	------
Waitresses	107	41	66	2	------	49
Totals	342	183	159	6	21	103

TABLE XI. Oriental Employment

(Showing Number of Persons Furnished Positions in Various

Occupations.	Total number of persons given employment.	Number of persons given employment in San Francisco.	Number of persons given employment outside San Francisco.	Wages per week.			
				$5.00 and under.	Over $5.00 to $7.50.	Over $7.50 to $10.00.	$10.00 and over.
Bedmakers	16	14	2	----	----	----	----
Cooks	101	73	28	----	2	5	----
Help, kitchen	24	22	2	----	----	----	----
Help, laundry	11	7	4	----	----	----	----
House servants	43	37	6	----	1	1	----
Pantrymen	3	2	1	----	----	----	----
Porters	11	9	2	----	----	----	----
School boys	21	20	1	8	----	----	----
Waiters	31	21	10	----	1	----	----
Totals	261	205	56	8	4	6	----

Agencies in San Francisco.

Occupations, their Wages and Fees, during Month of April, 1910.)

per month.						Fees.							
$30.00	$35.00	$40.00	$45.00	$50.00	$60.00 and over	$1.00	$1.50	$2.00	$2.50	$3.00	$3.50	$4.00	$5.00 and over
3	6	2	3				4	25	10	5			
15	6	11	2	9	8	1	2	5	15	7	2	10	16
15	8	7	1	1	1		5	22	19	7		3	2
19	7	6		1		3	3	10	18	12	1		
	2	4				1			1	3		2	
1									1				
	2					1	1			1	1		
	16								16				
32	21	3				4	2	51	45	4	1		
85	68	33	6	11	9	10	17	113	125	39	5	15	18

Agencies in San Francisco.

Occupations, their Wages and Fees, during Month of April, 1910.)

Wages per month.										Fees.									
$10.00 and under	$15.00	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$60.00 and over	$0.25	$0.50	$1.00	$1.50	$2.00	$2.50	$3.00	$3.50	$4.00	$5.00 and over
				13	2	1					2	1		1	2	9	1		
		1	1	26	17	25	11	7	6	5	6	11	8	8	5	23	7	18	10
			2	8	10	4				1		1	1		2	12	3	4	
				2	3	5	1									1	4	5	1
		3	11	21	5				1		3	2	3	5	8	17	3	1	1
						2		1				1	1					1	
					4	5	2					5		1			2	2	1
2	2	2	2	4	1					2	2	8	4	2	1	2			
			2	14	8	4	2				3	1	5	5	3	9	2	3	
2	2	6	18	88	50	46	16	8	7	8	16	30	22	22	21	73	22	34	13

EMPLOYMENT AGENCIES

TABLE I. EMPLOYMENT AGENCIES IN SAN FRANCISCO.

(Showing number of persons furnished positions in various occupations, their wages and fees for fiscal year 1908-09.)

Occupation	Total number of persons given employment	Number of persons given employment in San Francisco	Number of persons given employment outside San Francisco	Wages per day																Wages per month															Fees													Average fee
				$1.00 and under	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.50	$5.00	$6.00 and over	$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$75.00	$80.00	$90.00	$100.00 and over	$0.25	$0.50	$1.00	$1.25	$1.50	$1.75	$2.00	$2.50	$3.00	$3.50	$4.00	$5.00	$6.00 and over	
Bakers	259	105	154							1		2						1				3	17	29	61	39	26	16	22	20	4	9	6	3		2	8		28		78	60	48	7	14	12	2	$2 52
Barkeepers	47	9	38					1				1									3	1	5	2	9	2	11			8	4						1		3	1	10	7	13	3	5	4		2 85
Blacksmiths	484	90	394			1	1	14	21	86	19	134	20	77	5	18						1			[illegible]	9	42	1	11	7	6	3	2		1	2	8	1	17		126	142	127	26	25	9		2 70
Bricklayers	120	24	96					2		6		6	15	13		21	9	40	7															1		7	7		9		28	15	32	1	6	15		2 63
Butchers	141	16	125					1		3		1				1							5	4	31	20	21	2	3	14	11	11	8	2			1		4		29	37	51	10	5	4		2 73
Carpenters	1110	398	1012			6	3	35	27	236	51	416	35	371	60	125	9	14					1	2	1		1	2	7		7		1		5	31	68		79		367	294	336	164	53	13		2 50
Choremen	702	85	617	12	2	5	2	1												135	140	172	172	46	9	1	4		1						1	10	200	10	169		211	84	16	1				1 64
Clerks	40	21	19			3		2				4									3		6	1	1	3	9		4	3	1		1	1			6		8		12	5	8	3		1	2	2 28
Cooks	1694	459	1285	13		9	1	23	1	8		11						1		1	34	62	152	213	265	143	272	52	210	93	59	38	18	15	1	10	96	1	182		464	308	340	66	113	95	18	2 58
Drillers	208	25	178				2	111	30	19	8	27		4				2																			33	7	60	3	57	3	38		2			1 87
Engineers	220	44	176					7		19	5	49	10	[illegible]		13		1	1				1	2	5	12	8		21	8	17	3	1	25			7		1		12	24	72	8	27	47	22	3 84
Firemen	59	9	50					3	1	7	1	1				1							7	4	15	6	4				2	4							2		6	9	22	6	9	5		3 14
Foremen	98	19	79					5	2	9	3	20	2	14		10	2	2	2					1	3		3	1	6	2	8			3					3		17	20	32	4	9	13		3 05
Gardeners	234	20	214		2			16	3	2		28								1	2	17	68	57	13		11	4	7	2	1						15		21		96	17	10	5	5	3	2	2 [illegible]
Help, general	1207	725	482	52	397	50	33	117	16	71	14	9	10	1			2	1		36	53	81	93	45	49	37	22	3	5	5	[illegible]		1		12	22	547	13	166		289	79	65	3	7	4		1 [illegible]
Help, hotel	247	174	73	3		2														8	31	49	35	47	42	13	4	5	5	2			1			2	47	2	53		98	31	8	1	3	2		1 83
Help, kitchen	1618	1031	587	99	34	18	11	15		5										18	217	372	386	246	86	61	10	3	4	3					4	30	422	16	510	1	501	70	31		2		1	1 57
Laborers, general	13688	5620	8068	101	95	200	5311	5562	952	837	51	136	12	19			1			1	3	17	169	71	41	40	4	3	18	12	29				543	762	4783	188	3840	99	3191	175	95	1	11			1 36
Laborers, railroad	8659		8659		36	328	3870	2359	1467	474	37	14										6	52	12	4										124	38	951	56	1130	94	4365	660	1160	8	73			1 97
Men and wives	253	15	248		2		1	2														2	6		22	25	103	10	13	16	11	5	1	1			1		3		21	19	52	19	70	54	9	3 69
Milkers and dairymen	452	27	425	3	5	1		1		1										1	3	7	91	185	121	13	8	6	3	2	1					1	17	2	63	1	214	94	19	6	5			2 14
Miners	830		830				26	70	160	215	85	162	44	23									1	1			1	1	2	2	3		2	2			46	5	99		367	113	191	6	3			2 19
Painters	224	102	122		1	1		11		43	1	92	3	41	4	9	1						6	4		1		2	1	1	2					4	79		55		68	41	15	1	1			1 85
Porters	372	235	137	12		5		1		1							1			25	32	66	104	31	31	31	20	6	6						3	2	76	[illegible]	88		151	28	14		2	2		1 55
Ranch hands	2234		2231	181	409	525	10	21	[illegible]	11	1									1	33	113	489	96	24	10	3			1					6	8	413	21	974	8	696	80	25	1	2			1 61
Sawmill hands	834	30	801	6	20	7	15	169	25	138	11	48		11		9						26	109	68	31	26	24	8	32	15	3	3			1	6	72	2	196	6	102	67	70	8	4			1 93
Stablemen	486	283	203	5	1	3		41	3	32		22								2	10	11	110	64	42	18	35	3	23	22	30	3	3		3	6	16		75	3	201	85	18	11	5	3		2 05
Teamsters	2100	268	1832	11	128	69	82	996	173	81	3	15									1	17	268	167	31	6	14	3	24	7	2	2			2	41	522	9	635	7	959	69	27	1	18			1 70
Waiters	942	175	767	10		15	1	9		13	1							1		1	29	267	299	146	58	51	3	6	2						12	17	86		191	4	108	152	66	2	3	1		1 92
Unclassified	1320	292	1028			9	1	26	22	159	29	256	25	161	14	151	55	13	4	1	4	1	27	25	53	45	40	4	23	33	47	14	24	7	19	19	9		90	8	307	190	27	100	87	57	17	2 60
Totals	41177	10301	30876	838	1132	1257	9400	9624	2906	2507	323	1157	176	741	83	361	80	106	14	264	598	[illegible]	2679	1572	1053	611	701	141	483	278	251	98	72	60	737	1020	[illegible]	436	8784	245	13755	3007	3417	172	569	513	73	$1 81

TABLE II. EMPLOYMENT AGENCIES IN SAN FRANCISCO.

(Showing number of persons furnished positions in various occupations, their wages and fees for fiscal year 1909-10.)

OCCUPATIONS.	Total number of persons given employment	Number of persons given employment in San Francisco	Number of persons given employment outside San Francisco	WAGES PER DAY.																WAGES PER MONTH.															FEES													Average fee paid
				$1.00 and under	$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.50	$5.00	$6.00 and over	$15.00 and under	$20.00	$25.00	$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$75.00	$80.00	$90.00	$100.00 and over	$0.25	$0.50	$1.00	$1.25	$1.50	$1.75	$2.00	$2.50	$3.00	$3.50	$4.00	$5.00	$6.00 and over	
Bakers	429	156	273		1			6	1	1			1	4						1	7	5	23	44	95	21	64	7	43	28	38	20	9	10			32	3	50		93	61	82	17	28	43	20	$2 80
Barkeepers	42	10	32					1								1					3		1	3	9	1	9		9	1	1	2	1				2		4		3	11	9	2	2	8	1	3 68
Blacksmiths	526	68	158		1	7	4	40	13	63	10	133	33	118	1	16	3					1	1		5	5	31	2	14	8	10	4	1	2		1	21		31		120	125	143	35	46	4		2 61
Bricklayers	75	19	56									6		4		26		30	9																	4	9		11		16	17	15	2	1			2 10
Butchers	127	9	118	1				2				1											9	2	21	27	15		9	10	16	10	4				4		6		22	40	43	2	4	3	3	2 70
Carpenters	1730	328	1402		2	8		23	16	152	33	154	124	664		184	10	8					3	1	2		11		4		1				6	34	97		105	5	407	328	588	79	57	24		2 48
Choremen	659	99	560	4				1												91	121	170	166	68	10	8	7	1	1	6	1			1		9	159		235	1	203	36	10	1	2	3		1 62
Clerks	58	33	25							2		1									2		9	6	9	2	12		8	2	4			1		1	3		6		10	5	6	6	5	8	8	3 31
Cooks	1851	448	1403	7		13	1	21	2	28		9				2				5	22	51	128	153	275	160	361	51	260	98	140	31	19	1	2	10	105	1	153	2	484	387	333	86	129	103	56	2 70
Drillers	331	31	300					7	131	67	10	55	7	17		5															1		1			1	41		103	2	131	32	17	1	3			1 84
Engineers	231	24	207		1			6		11	2	19	6	13	2	26	2	9					3	1	11	8	13		9	1	12	4	2	15			1		2		15	27	88	24	34	30	10	3 44
Firemen	121	13	108			2		3	1	29	6	12		4								2	11	4	17	15	6		1		5						3		6		26	28	37	7	11	3		2 71
Foremen	184	14	170					2		28	4	53	9	28		8	5	10	1			1	1			2	6	1	3	6	9		3	4			2		1		20	31	68	13	25	23	1	3 21
Gardeners	146	24	122	6	5	1	2	1	6	1											1	15	64	33	4	2	3			2					1	3	7		27		62	30	13	2	1			2 04
Help, general	2620	804	1816	82	14	120	47	368	294	348	55	59	11	7	1	14	4			13	52	78	143	138	135	156	81	21	14	35	25	3	2		9	79	813	6	645	2	680	206	123	15	23	14	5	1 65
Help, hotel	631	435	196	1	2	7	1	4				2								37	60	113	169	94	74	24	16	2	12	4	2		1	3		9	130	1	146	1	165	69	57	16	23	13	1	1 97
Help, kitchen	2226	1313	913	85	20	36	2	13	1	5		1								47	179	394	681	464	154	89	34	4	9	8					6	47	790	16	740	4	448	111	42	9	10	1		1 49
Laborers, general	22545	4860	17685	28	148	211	6166	7542	1526	2188	155	116	86	54		6		1		5	4	61	886	185	61	34	23	7	2	2	2			50	522	903	8531	154	6544	57	5313	248	220	34	19			1 38
Laborers, railroad	9583	143	9440			913	2371	2939	2377	897	20	5		18			4						26	5					4	3	1					40	4466	228	1618	100	1872	328	901	10	20			1 54
Men and wives	157	9	148					1	2													2	4		11	3	62	8	24	14	17	5	2	2			1		3		12	15	47	10	36	29	4	3 54
Milkers	500	26	474		1	1			1		4			1							1	9	63	165	205	36	5	4	1	15	2						24	1	96	5	253	96	23	1	1			2 00
Miners	594	7	587				7	6	5	116	74	280	29	51	3	8								1	3									11			15		80		270	98	119			12		2 25
Painters	229	132	97	1		7	1	13		44	2	95	2	49			3						1	2	1	2	5			1						12	34	1	39		102	22	16	1	2			1 81
Porters	795	533	262	4		7		11		3		2								19	49	153	180	136	91	56	48	4	11	14	4					7	161	1	223		271	56	10	15	14	6	1	1 82
Ranch hands	2615	19	2566	196	592	743	109	138	6	71	6	7				1				4	16	69	385	176	61	7	14	1	5	6				2	2	18	717	50	1208	8	489	54	29		11			1 48
Sawmill hands	536	9	527		1	11	109	55	4	24	37	20	1	7		1	6	2				5	156	16	5	22	16	27	7	1		3				6	48	1	92	5	216	94	25	3	5			1 96
Stablemen	495	212	283	1		1		37	19	14	1	15								1	5	20	99	85	58	10	21	3	51	31	23				1	11	166	8	120	7	363	53	34	1	3			1 68
Teamsters	1067	141	926	10	76	129	21	119	281	123	2	81	4								1	11	52	53	64	9	12	2	8	5	4				14	16	181	13	286	4	483	129	70	19	15	1	3	1 91
Waiters	1264	324	940	5	1	4		11		8		12								6	22	188	502	256	149	19	26	9	6	5	2	1	2		3	19	77	7	116	9	290	252	316	80	51	34	8	2 47
Unclassified	1292	233	1059			1	3	40	14	127	22	325	90	305	26	141	18	41	17			1	7	10	14	6	7	4	8	9	20	3	24	9														
Totals	53659	10506	43153	134	1165	2222	8841	11410	7733	4350	473	1793	403	1374	33	439	55	101	27	229	545	1352	3773	2001	1544	719	908	154	526	301	340	86	71	124	566	1235	16937	194	13170	212	12927	3002	3524	195	612	364	121	$1 66

CHART IV.

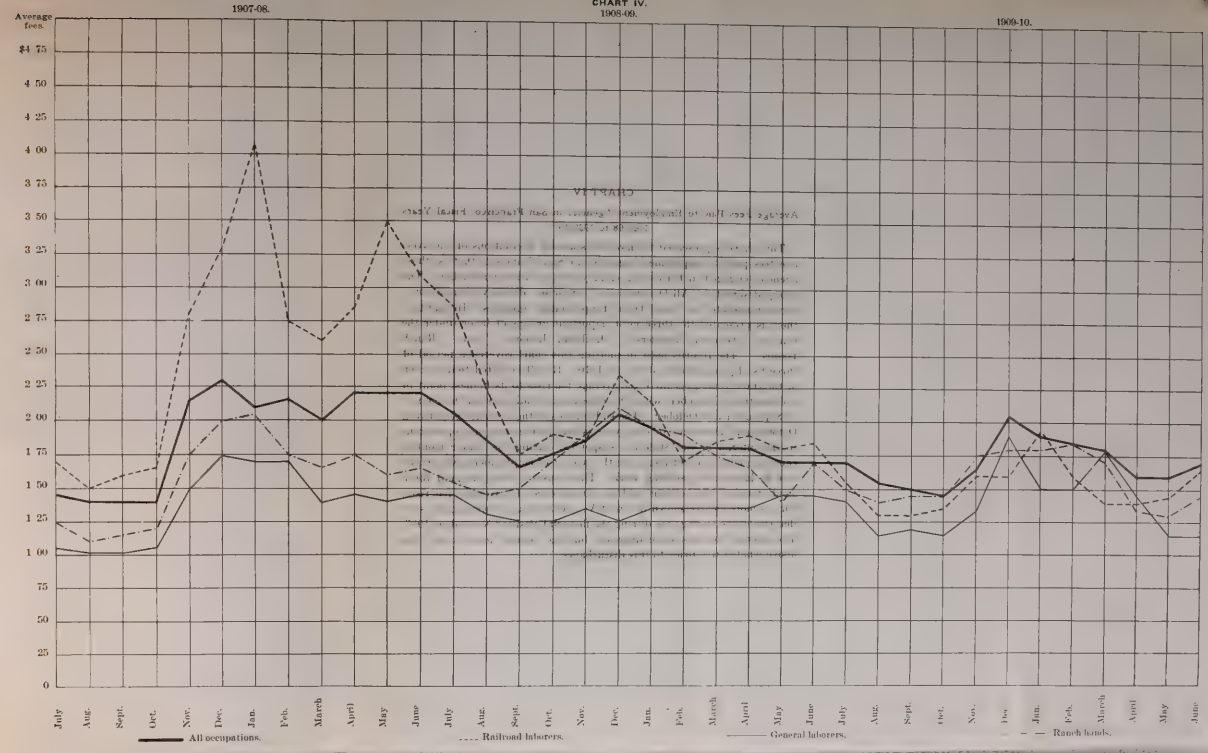
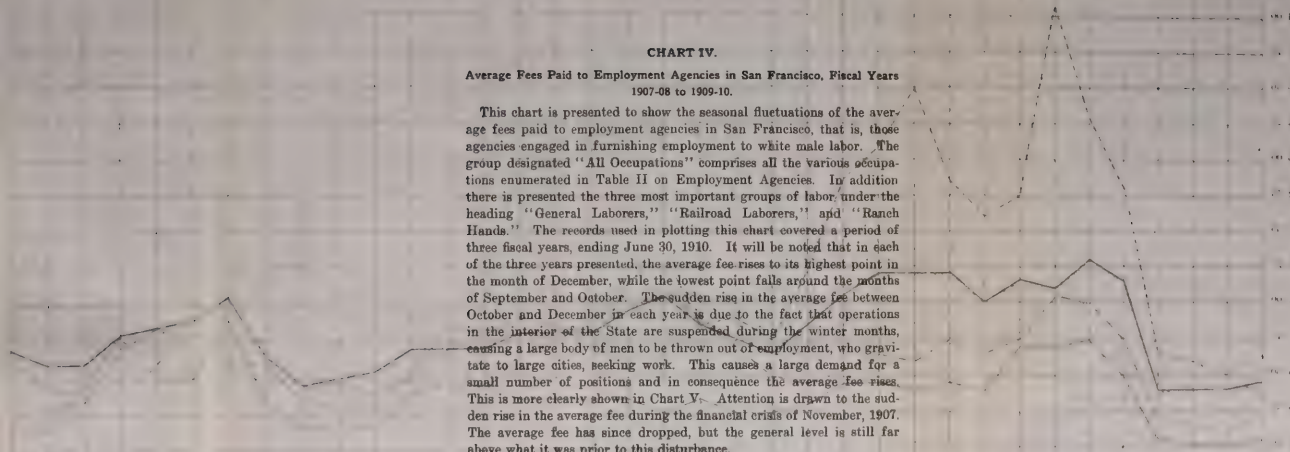

1907-08.
1908-09.
1909-10.
Average fees.
$4 75
4 50
4 25
4 00
3 75
3 50
3 25
3 00
2 75
2 50
2 25
2 00
1 75
1 50
1 25
1 00
75
50
25
0
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
March
April
May
June
All occupations.
Railroad laborers.
General laborers.
Ranch hands.

CHART IV.

Average Fees Paid to Employment Agencies in San Francisco, Fiscal Years 1907-08 to 1909-10.



This chart is presented to show the seasonal fluctuations of the average fees paid to employment agencies in San Francisco, that is, those agencies engaged in furnishing employment to white male labor. The group designated "All Occupations" comprises all the various occupations enumerated in Table II on Employment Agencies. In addition there is presented the three most important groups of labor under the heading "General Laborers," "Railroad Laborers," and "Ranch Hands." The records used in plotting this chart covered a period of three fiscal years, ending June 30, 1910. It will be noted that in each of the three years presented, the average fee rises to its highest point in the month of December, while the lowest point falls around the months of September and October. The sudden rise in the average fee between October and December in each year is due to the fact that operations in the interior of the State are suspended during the winter months, causing a large body of men to be thrown out of employment, who gravitate to large cities, seeking work. This causes a large demand for a small number of positions and in consequence the average fee rises. This is more clearly shown in Chart V. Attention is drawn to the sudden rise in the average fee during the financial crisis of November, 1907. The average fee has since dropped, but the general level is still far above what it was prior to this disturbance.

CHART V.

Relation of Average Fees to Number Employed, 1907-08 to 1909-10.

The upper curve represents the total number of persons to whom employment was furnished in each month during the three fiscal years ending June 30, 1910. The lower curve represents the average fees paid by these persons. It will be noticed that as the number of persons employed increased, the average fee decreased. The chart brings out clearly the relation between the supply and demand of labor and the fee charged by employment agents. During the winter months when the supply of labor was greater than the demand, the fees were high, while during the summer months when the supply of labor was equal to or less than the demand, the fees were small.

CHART V.

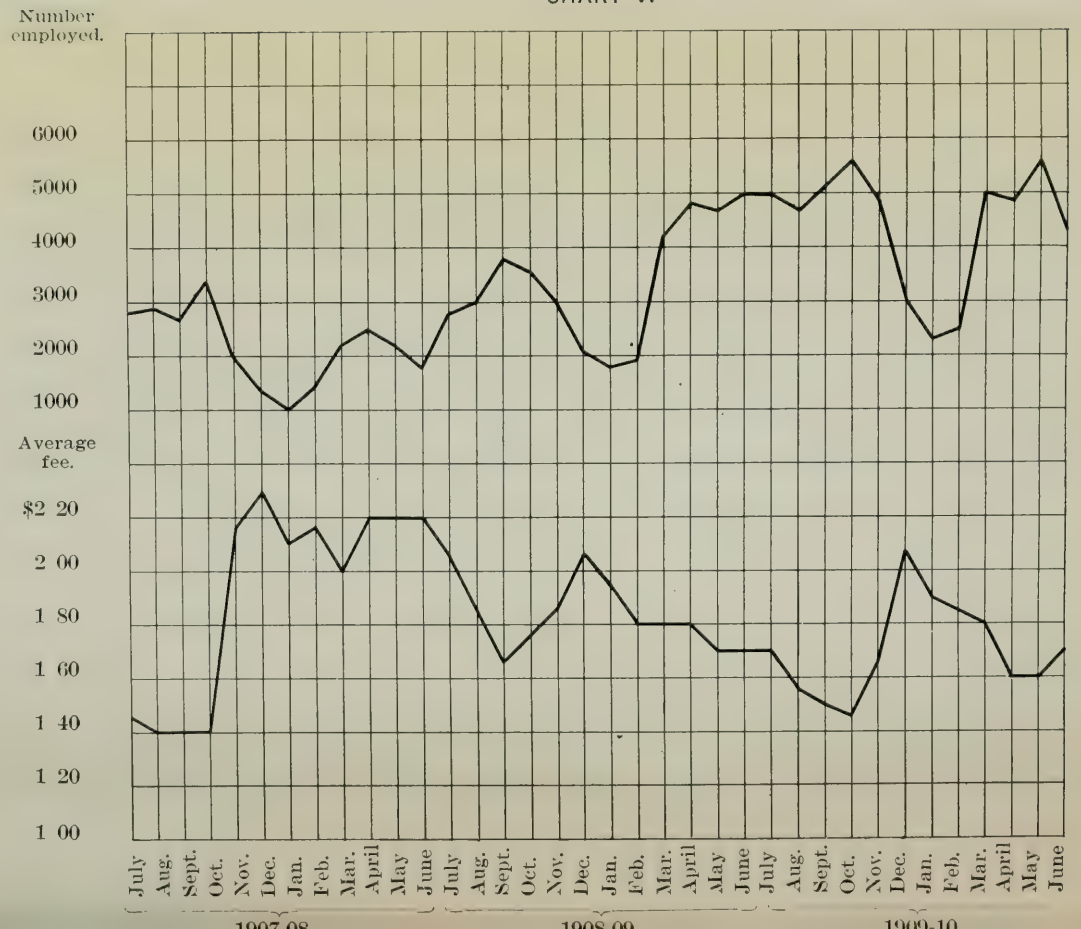

Number employed.
6000
5000
4000
3000
2000
1000
Average fee.
$2 20
2 00
1 80
1 60
1 40
1 20
1 00
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
April
May
June
1907-08
1908-09
1909-10

TABLE III. EMPLOYMENT AGENCIES IN CITY OF LOS ANGELES.

(Showing number of persons furnished positions in various occupations, their wages and fees, for fiscal year 1909-10.)

OCCUPATIONS.	Total number of persons given employment.	Number of persons given employment in Los Angeles.	Number of persons given employment outside Los Angeles.	WAGES PER DAY. $1.00 and over.	$1.25.	$1.50.	$1.75.	$2.00.	$2.25.	$2.50.	$2.75.	$3.00.	$3.25.	$3.50.	$3.75.	$4.00.	$4.50.	$5.00.	$5.00 and over.	$10.00 and under.	WAGES PER MONTH. $20.00.	$25.00.	$30.00.	$35.00.	$40.00.	$45.00.	$50.00.	$60.00.	$70.00.	$80.00.	$90.00.	$100.00.	$100.00 and over.	FEES. $.25.	$.50.	$.75.	$1.00.	$1.25.	$1.50.	$1.75.	$2.00.	$2.50.	$3.00.	$4.00.	$5.00.	$6.00.	$7.00.	$8.00.	$9.00.	$10.00 and over.	Average fee.
Bakers	737	530	207			1		4		7		4		3		1					4	5	31	53	57	39	169	36	107	57	129	18	11	1	1	1	52		107		195	139	152	31	36	23	6	$2 34
Barkeepers	9	3	6																								4		3		2																
Blacksmiths	569	211	358		1	1		41	27	75	4	108	16	113	8	38	8	1			1	2	2	3	3	33	3	38	2	10	1						3	35	2	34		181	130	148	12	50	4		3 44
Bricklayers	66	33	33						1	4		2		2		9	5	41	2																													2 37
Butchers	85	31	54								1	2		1							3		2	4	6	1	10		19	8	21	2	5				2	3		4		16	8	26	4	10	6	6	3 05
Carpenters	1868	727	1141					21	101	154	46	492	118	743	10	131	6	20							1		1	4		3		2		11	1	8	28	99		231		566	382	406	33	30	85		2 96
Choremen	163	65	98	4	1	2				1																											4	55		52	1	43	9	1					1 51
Clerks	158	116	42	2			2	4		3		1								15	23	25	64	18	5	3	2																					1 51
Cooks	1783	974	809	2		2	1	5		9	2	6		4		3		1		2	7	20	80	130	239	115	410	35	283	141	197	40	30	19	9	16	88	5	106		368	266	104	107	202	142	79	2 91
Drillers	133		133						92	11	14	3	2	8						3																												
Engineers	250	98	152			1		2		22		24	6	32		30	1	1	1		1			8	13	4	31		21	5	30		10	7	1	1	3				1	72		22		25	1	10		2		1 49
Firemen	67	31	36					1	10	2	9	2	9									1	3	3	1	5	12			2	5		2			1	2						47	36	9	17	39	23	2	3 06
Foremen	148	42	106						5	15	5	23	6	17		10	2	6						1	1	5	4	2	13	4	24		3	2									3		35	18	44	13	18	13	4	3 31
Gardeners	136	70	66		4	8		12	12	2		2		1							2	17	27	24	13	1	7		2		1	1			4	1	8			25		70	30	6		2			1 93
Help, general	2657	1353	1304	62	34	150	136	539	209	256	2	99		7		4				28	26	133	205	188	200	83	192	17	46	13	27			1	158	190	613	13	542	18	753	178	84	24	42	31	1	2 64
Help, hotel	1140	992	148	7			1	12		1										29	32	77	209	352	246	35	64	55	3	8	5	3		1	8	33	194	4	541	4	227	64	49	10	3	2	1	1 82
Help, kitchen	2099	1658	441	24	2	16	1	34		7		2								21	37	157	530	1057	153	29	15	5	4	2				3	42	53	388	5	1141	1	433	77	39	14	5	1		2 77
Laborers, general	8214	2849	5365	59	27	254	662	4025	1726	1145	14	133	3	12				1			2	8	55	11	7	4	10	5	3		16			2	380	640	4113	128	1530	21	1217	64	48	29	55	9		1 42
Laborers, railroad	1847	61	1786	7	101	99	565	946	70	42		15												2																	126	1376		164	96	104	22	10	3	4		1 14
Men and wives	350	35	315					2																	6	9	59	6	60	19	83	58	13	35			3		1		16	12	16	14	62	100	89	4 19
Milkers	798	163	635		1			1													1	17	42	105	518	63	39	4	5	1	1						1	16	2	73	3	375	93	36		5			2 16
Miners	376	3	373																																						2		7	1	97	119	133	9	2	1		2 79
Painters	32	22	10					1	1	1		13				11		4																							1		6		2		16	6	1			3 85
Porters	381	306	75	1		4				2	3			1							1	8	75	76	70	43	26	53	6	8	2	2					2	2	38	1	65	2	157	85	25	1	2	1		1 09
Ranch hands	4680	155	4525	14	225	760	256	294	22	42	3	20	1	4			2	1			3	8	21	908	1919	125	14	24	1	3	6	1			3	3	68	1215	7	2196	20	1068	48	45	1	8	5		1 59
Sawmill hands	26	3	23						5	6		2		1										2			8	2									2	7	1	11	4	1							1 93
Stablemen	421	281	140		4	3		6	2	3														9	20	51	25	7	188	27	56	6	11			7	1	28	2	76	2	244	39	36	17	1	1		1 89
Teamsters	4524	1332	3192	26	203	94	23	1944	1160	252	5	49	1	7		2					1	1	8	208	351	85	21	54	2	18	6				3	14	44	1951	19	1185	12	1054	132	83	21	4	5		1 48
Waiters	666	352	314	9	1	2		21		14		3		2							6	6	49	118	156	123	114	23		9	4		1	2	3	26	19	63	8	124	1	292	66	40	13	7	3	2	1 87
Unclassified	1210	498	712		1	90	10	32	52	173	25	314	13	137	10	136	50	44	8		1	8	7	11	27	1	21	2	25	11	52	3	8	6	3	25	165	5	144		291	176	208	50	68	38	16	2 78
Totals	35593	12984	22599	217	604	1417	1659	7992	3502	2312	125	1440	168	1289	30	399	74	116	14	106	164	635	614	1543	1911	611	1463	207	736	303	625	132	96	89	648	1267	10516	293	8416	147	7974	1440	2205	428	630	56	96	$2 71

CHART V.



CHILD LABOR

CHILD LABOR

Table I.

During the fiscal year ending June 30, 1909, 2,527 age and schooling certificates were issued in the State. Of this number 1,375 were issued to literate males and 870 to literate females, making a total of 2,245 certificates issued to literates. 179 certificates were issued to illiterate males and 103 to illiterate females, making a total of 282 certificates issued to illiterates.

In the county of San Francisco 808 certificates were issued. Of this number 765 were issued to literates, and 43 to illiterates. In the county of Los Angeles 1,077 certificates were issued, of which 954 were issued to literates and 123 to illiterates. In the county of Alameda 404 certificates were issued, of which 295 were issued to literates and 109 to illiterates.

Ninety and six-tenths per cent of the total number of certificates were issued to the counties of San Francisco, Los Angeles, and Alameda.

Table III.

Of the total number of certificates issued to literates, 47.6 per cent were born in California, 40.2 per cent were born in the United States, exclusive of California, and the remaining 12.2 per cent in foreign countries. Of the total number issued to illiterates, 24.1 per cent were born in California, 16.7 per cent in the United States, exclusive of California, 20.0 per cent in Russia, 13.1 per cent in Hawaii, 10.0 per cent in Italy, and 16.1 per cent in other foreign countries.

Table II.

During the fiscal year ending June 30, 1910, 2,723 age and schooling certificates were issued in the State. Of this number 1,503 were issued to literate males and 922 to literate females, making a total of 2,425 certificates issued to literates. 219 certificates were issued to illiterate males and 79 to illiterate females, making a total of 298 certificates issued to illiterates.

In the county of San Francisco 737 certificates were issued, of which 718 were issued to literates and 19 to illiterates. In the county of Los Angeles 1,298 certificates were issued of which 1,088 were issued to literates, and 210 to illiterates. In the county of Alameda 415 certificates were issued, of which 352 were issued to literates and 63 to illiterates. The certificates issued in these three counties make up 90.0 per cent of the total issued in the State.

Table IV.

Of the total number of certificates issued to literates, 47.2 per cent were born in California, 41.8 per cent in the United States, exclusive of California, and the remaining 11.0 per cent in foreign countries.

Of those issued to illiterates, 21.1 per cent were born in California, 36.9 per cent in the United States, exclusive of California, 15.5 per cent in Russia, 8.1 per cent in Hawaii, 4.4 per cent in Italy, the remaining 14.0 per cent being born in other foreign countries.

Table V.

In the investigation of stores and factories throughout the State, a record was kept of the number and ages of minors employed. In the establishments investigated there were employed a total of 157,886, of which 296, or 0.2 per cent, were minors from twelve to fourteen years of age, 2,184, or 1.4 per cent, were minors between fourteen and sixteen years of age, and 7,230, or 4.5 per cent, were minors from sixteen to eighteen years of age, making a total of 9,710 minors employed. These minors under the age of eighteen years constituted 6.1 per cent of the total number of persons employed, which shows a slight decrease when compared with the figures compiled in the last report of this Bureau, in which the number of minors under eighteen years of age constituted 7.0 per cent of the total number of persons employed. In the city of San Francisco minors constituted 5.6 per cent of the total number of persons employed; in the city of Los Angeles 5.2 per cent, and in the city of Oakland 10.5 per cent. A marked decrease in the percentage of minors employed in stores and offices in San Francisco was shown. In this investigation they amounted to 6.7 per cent of the total number of persons employed, whereas, in the previous investigation, they amounted to 13.8 per cent. The percentage employed in factories remains about the same, namely, 4.9 per cent.

Table VI.

Some of the principal industries employing minors were canneries, drug stores, department stores, dry goods stores, confectionery, and printing and binding.

In canneries, minors under 18 years constituted 22.3 per cent, in drug stores 16.8 per cent, in department stores 15.5 per cent, in dry goods stores 15.1 per cent, in confectionery 13.9 per cent, and in printing and binding establishments 12.2 per cent.

TABLE I. Age and Schooling Certificates Issued in State

(Showing Age. Sex and Literacy

Counties.	Total certificates issued	Total.					
		Male.			Female.		
		Total.	14 years.	15 years.	Total.	14 years.	15 years.
Alameda	404	242	156	86	162	92	70
Alpine	None issued.						
Amador	None issued.						
Butte	11	4	2	2	7	3	4
Calaveras	None issued.						
Colusa	None issued.						
Contra Costa	None issued.						
Del Norte	None issued.						
El Dorado	None issued.						
Fresno	32	14	8	6	18	10	8
Glenn	None issued.						
Humboldt	None issued.						
Imperial	None issued.						
Inyo	None issued.						
Kern	2	2	2				
Kings	6	4		4	2	2	
Lake	None issued.						
Lassen	None issued.						
Los Angeles	1077	682	454	228	395	227	168
Madera	None issued.						
Marin	1	1	1				
Mariposa	None issued.						
Mendocino	None issued.						
Merced	None issued.						
Modoc	None issued.						
Mono	None issued.						
Monterey	None issued.						
Napa	16	9	3	6	7	3	4
Nevada	None issued.						
Orange	None issued.						
Placer	None issued.						
Plumas	None issued.						
Riverside	None issued.						
Sacramento	62	24	14	10	38	25	13
San Benito	None issued.						
San Bernardino	10	3	3		7	4	3
San Diego	22	21	18	3	1	1	
San Francisco	808	487	354	133	321	188	133
San Joaquin	33	20	15	5	13	5	8
San Luis Obispo	None issued.						
San Mateo	None issued.						
Santa Barbara	None issued.						
Santa Clara	9	8	4	4	1	1	
Santa Cruz	None issued.						
Shasta	None issued.						
Sierra	None issued.						
Siskiyou	10	10	4	6			
Solano	8	7	5	2	1	1	
Sonoma	None issued.						
Stanislaus	None issued.						
Sutter	None issued.						
Tehama	14	14	4	10			
Trinity	None issued.						
Tulare	None issued.						
Tuolumne	2	2	2				
Ventura	None issued.						
Yolo	None issued.						
Yuba	None issued.						
Totals	2527	1554	1049	505	973	562	411

of California for the Fiscal Year ending June 30, 1909.

of Applicants, by Counties.)

Total	Literate.						Total	Illiterate.					
	Male.			Female.				Male.			Female.		
	Total	14 years	15 years	Total	14 years	15 years		Total	14 years	15 years	Total	14 years	15 years
295	179	115	64	116	64	52	109	63	41	22	46	28	18
11	4	2	2	7	3	4							
32	14	8	6	18	10	8							
2	2	2											
6	4		4	2	2								
954	598	396	202	356	209	147	123	84	58	26	39	18	21
1	1	1											
16	9	3	6	7	3	4							
59	23	13	10	36	25	11	3	1	1		2		2
10	3	3		7	4	3							
22	21	18	3	1	1								
765	460	336	124	305	178	127	43	27	18	8	16	10	6
33	20	15	5	13	5	8							
9	8	4	4	1	1								
6	6	3	3				4	4	1	3			
8	7	5	2	1	1								
14	14	4	10										
2	2	2											
2245	1375	930	445	870	506	364	282	179	119	60	103	56	47

TABLE II. Age and Schooling Certificates issued in State

(Showing Sex, Age and Literacy

Counties.	Total certificates issued	Total.					
		Male.			Female.		
		Total.	14 years.	15 years.	Total.	14 years.	15 years.
Alameda	415	246	152	94	169	102	67
Alpine	None issued.						
Amador	None issued.						
Butte	17	10	9	1	7	3	4
Calaveras	None issued.						
Colusa	None issued.						
Contra Costa	2	2	1	1			
Del Norte	None issued.						
El Dorado	None issued.						
Fresno	49	24	13	11	25	14	11
Glenn	1	1	1				
Humboldt	No record.						
Imperial	None issued.						
Inyo	None issued.						
Kern	None issued.						
Kings	3	2	2		1		1
Lake	None issued.						
Lassen	None issued.						
Los Angeles	1298	827	544	283	471	296	175
Madera	None issued.						
Marin	5	3	2	1	2	2	
Mariposa	None issued.						
Mendocino	None issued.						
Merced	3	1		1	2		2
Modoc	None issued.						
Mono	None issued.						
Monterey	None issued.						
Napa	25	18	10	8	7	2	5
Nevada	None issued.						
Orange	None issued.						
Placer	None issued.						
Plumas	None issued.						
Riverside	None issued.						
Sacramento	87	30	15	15	57	30	27
San Benito	None issued.						
San Bernardino	None issued.						
San Diego	23	21	16	5	2	2	
San Francisco	737	483	314	169	254	174	80
San Joaquin	10	9	6	3	1	1	
San Luis Obispo	None issued.						
San Mateo	None issued.						
Santa Barbara	None issued.						
Santa Clara	28	25	14	11	3	1	2
Santa Cruz	None issued.						
Shasta	None issued.						
Sierra	None issued.						
Siskiyou	7	6	1	5	1		1
Solano	4	4	3	1			
Sonoma	1	1		1			
Stanislaus	None issued.						
Sutter	None issued.						
Tehama	8	8	5	3			
Trinity	None issued.						
Tulare	None issued.						
Tuolumne	None issued.						
Ventura	None issued.						
Yolo	None issued.						
Yuba	None issued.						
Totals	2723	1721	1108	613	1002	627	375

of California during Fiscal Year ending June 30, 1910.
of Applicants, by Counties.)

Total	Literate.						Total	Illiterate.					
	Male.			Female.				Male.			Female.		
	Total	14 years	15 years	Total	14 years	15 years		Total	14 years	15 years	Total	14 years	15 years
352	204	125	79	148	84	64	63	42	27	15	21	18	3
17	10	9	1	7	3	4							
2	2	1	1										
49	24	13	11	25	14	11							
1	1	1											
3	2	2		1		1							
1088	660	417	243	428	260	168	210	167	127	40	43	36	7
5	3	2	1	2	2								
3	1		1	2		2							
25	18	10	8	7	2	5							
82	28	14	14	54	29	25	5	2	1	1	3	1	2
23	21	16	5	2	2								
718	476	310	166	242	165	77	19	7	4	3	12	9	3
10	9	6	3	1	1								
28	25	14	11	3	1	2							
6	6	1	5				1	1		1			
4	4	3	1										
1	1		1										
8	8	5	3										
2425	1503	949	554	922	563	359	298	219	159	60	79	64	15

TABLE III. Age and Schooling Certificates Issued in State of California for the Fiscal Year ending June 30, 1909.

(Showing sex and literacy of applicants by countries of birth.)

Country of birth.	Total literate and illiterate.			Literate.			Illiterate.		
	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.
California	1136	678	458	1068	630	438	68	48	20
Rest of the United States	949	632	317	902	587	315	47	45	2
Austria-Hungary	12	4	8	8	3	5	4	1	3
British Isles	47	25	22	46	25	21	1	------	1
Canada	27	17	10	27	17	10	------	------	------
France	11	8	3	9	7	2	2	1	1
Germany	24	16	8	21	13	8	3	3	------
Hawaii	58	34	24	21	14	7	37	20	17
Italy	92	56	36	64	37	27	28	19	9
Mexico	11	4	7	8	3	5	3	1	2
Portugal	19	9	10	9	3	6	10	6	4
Russia	80	34	46	24	12	12	56	22	34
Scandinavia	7	6	1	7	6	1	------	------	------
Spain	21	10	11	5	2	3	16	8	8
Miscellaneous	33	21	12	26	16	10	7	5	2
Totals	2527	1554	973	2245	1375	870	282	179	103

TABLE IV. Age and Schooling Certificates Issued in State of California for Fiscal Year ending June 30, 1910.

(Showing sex and literacy of applicants by countries of birth.)

Country of birth.	Total literate and illiterate.			Literate.			Illiterate.		
	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.
California	1207	784	423	1144	731	413	63	53	10
Rest of the United States	1124	721	403	1014	622	392	110	99	11
Austria-Hungary	10	6	4	6	3	3	4	3	1
British Isles	36	22	14	35	21	14	1	1	------
Canada	22	14	8	19	11	8	3	3	------
France	5	3	2	5	3	2	------	------	------
Germany	8	6	2	6	4	2	2	2	------
Hawaii	46	26	20	22	12	10	24	14	10
Italy	82	41	41	69	33	36	13	8	5
Mexico	26	18	8	20	12	8	6	6	------
Portugal	12	5	7	6	1	5	6	4	2
Russia	74	33	41	28	15	13	46	18	28
Scandinavia	6	3	3	5	2	3	1	1	------
Spain	26	13	13	12	10	2	14	3	11
Miscellaneous	39	27	12	34	23	11	5	4	1
Totals	2723	1722	1001	2425	1503	922	298	219	79

TABLE V. Minors Employed in Stores and Factories in Different Localities in California.

Locality.	Total number of employees	Total number of minors	Percentage of minors	Minors. 16 to 18 years.			Minors. 14 to 16 years.			Minors. 12 to 14 years.		
				Total	Male	Female	Total	Male	Female	Total	Male	Female
San Francisco:												
Factories	38353	1864	4.9	1582	1021	561	280	189	91	2	2	------
Stores and offices	25761	1719	6.7	1190	836	354	523	298	225	6	6	------
Totals	64114	3583	5.6	2772	1857	915	803	487	316	8	8	------
Los Angeles:												
Factories	29445	1364	4.6	1123	790	333	171	129	42	70	70	------
Stores and offices	19933	1197	6.0	792	416	376	395	182	213	10	7	3
Totals	49378	2561	5.2	1915	1206	709	566	311	255	80	77	3
Oakland:												
Factories	8540	967	11.3	738	234	504	161	51	110	68	33	35
Stores and offices	4709	423	9.0	297	171	126	126	72	54	------	------	------
Totals	13249	1390	10.5	1035	405	630	287	123	164	68	33	35
Sacramento:												
Factories	2380	382	16.0	198	110	88	135	80	55	49	34	15
Stores and offices	2575	338	13.1	260	93	167	64	17	47	14	14	------
Totals	4955	720	14.5	458	203	255	199	97	102	63	48	15
San Jose:												
Factories	2875	405	14.1	240	134	106	114	56	58	51	51	------
Stores and offices	1288	64	5.0	59	43	16	4	4	------	1	1	------
Totals	4163	469	11.3	299	177	122	118	60	58	52	52	------
Stockton:												
Factories	1396	81	5.8	59	25	34	17	7	10	5	2	3
Stores and offices	653	54	8.3	49	38	11	5	4	1	------	------	------
Totals	2049	135	6.6	108	63	45	22	11	11	5	2	3

†Not stated.

San Diego:												
Factories	943	18	1.9	13	11	2	5	5				
Stores and offices	860	75	8.7	55	39	16	19	18	1	1	1	
Totals	1803	93	5.2	68	50	18	24	23	1	1	1	
Fresno:												
Factories	590	32	5.4	13	13		19	19				
Stores and offices	501	69	13.8	49	13	36	20	18	2			
Totals	1091	101	9.3	62	26	36	39	37	2			
Berkeley:												
Factories	1642	53	3.2	43	21	22	9	4	5	1	1	
Stores and offices	144	3	2.1	3	3							
Totals	1786	56	3.1	46	24	22	9	4	5	1	1	
Alameda:												
Factories	489	27	5.5	27	27							
Stores and offices	194	12	6.2	8	8		4	4				
Totals	683	39	5.7	35	35		4	4				
Pasadena:												
Factories	1368	119	8.7	82	42	40	25	8	17	12	3	9
Stores and offices	638	59	9.3	46	33	13	13	10	3			
Totals	2006	178	8.9	128	75	53	38	18	20	12	3	9
San Rafael:												
Factories	359	19	5.3	18	9	9	1		1			
Stores and offices	107											
Totals	466	19	4.1	18	9	9	1		1			
Miscellaneous:												
Factories	9801	284	2.9	219	169	50	62	48	14	3	3	
Stores and offices	2342	82	3.5	67	40	27	12	12		3	3	
Totals	12143	366	3.0	286	209	77	74	60	14	6	6	
Totals:												
Factories	98181	5615	5.7	4355	2606	1749	999	596	403	261	199	62
Stores and offices	59705	4095	6.9	2875	1733	1142	1185	639	546	35	32	3
Grand totals	157886	9710	6.1	7230	4339	2891	2184	1235	949	296	231	65

TABLE VI. Minors Employed in Selected Industries in California.

Industries. (Selected.)	Total number of employees	Total number of minors	Percentage of minors	Minors. Under 16 years.			Minors. 16 to 18 years.		
				Total	Male	Female	Total	Male	Female
Canneries	12788	2852	22.3	1010	366	644	1842	455	1387
Cigar and tobacco manufacturing	712	90	12.6	23	9	14	67	7	60
Clothing and furnishings manufacturing	5096	231	4.5	34	19	15	197	84	113
Confectioners	2929	407	13.9	47	18	29	360	96	264
Department stores	8050	1245	15.5	484	164	320	761	171	590
Dry goods stores	4976	753	15.1	357	157	200	396	135	261
Drug stores	1198	201	16.8	40	38	2	161	161	----
Glass manufacturing	1003	43	4.3	6	6	----	37	30	7
Laundries	6580	105	1.6	8	3	5	97	48	49
Machinery manufacturing and foundries	9061	340	3.8	16	16	----	324	315	9
Printers and binders	6522	796	12.2	311	293	18	485	419	66

ORIENTAL

ORIENTAL

Table II.

In the investigation of hours of labor and wages paid to Chinese by Chinese employers, in stores and factories in the city of San Francisco, a record was obtained from 154 establishments, employing a total of 1,622 persons, of whom 569, or 34.2 per cent, were classified as copartners. 1,014, or 62.5 per cent of the total number considered, worked 10 hours per day; 106, or 6.6 per cent, worked 11 hours; 361, or 22.2 per cent, worked 12 hours, and 141, or 8.7 per cent, worked over 12 hours. Wages paid to employees, excluding those paid to copartners (who share in the profits of the business), ranged from $3 to $21 per week. 2.0 per cent received from $3 to $6 per week; 20.2 per cent received from $6 to $9; 53.4 per cent received from $9 to $12; 20.9 per cent received from $12 to $15; 3.0 per cent received from $15 to $18, while 0.5 per cent received from $18 to $21.

Table III.

In the investigation of hours of labor and wages paid to Chinese by Chinese employers, in stores and factories in the city of Oakland, data was secured from 58 establishments, employing a total of 648 persons, of whom 403, or 62.2 per cent, were copartners. Of the total number of persons considered, 84.9 per cent worked 10 hours per day; 8.9 per cent worked 11 hours, and 6.2 per cent worked 12 hours. The wages paid to employees, excluding copartners, ranged from less than $3 to $15 per week. 0.8 per cent received less than $3 per week; 0.8 per cent received from $3 to $6; 29.0 per cent received from $6 to $9; 57.6 per cent received from $9 to $12; 11.8 per cent received from $12 to $15.

Table IV.

In a total of 154 Chinese establishments inspected in the city of San Francisco, the sanitation in 72, or 46.8 per cent, was reported as "good"; 75, or 48.7 per cent, as "fair," and in 7, or 4.5 per cent, as "bad." Ventilation in 76 establishments, or 49.3 per cent, was reported as "good"; 75, or 48.7 per cent, as "fair," and in 3, or 2.0 per cent, as "bad."

Table V.

Fifty-eight Chinese establishments were inspected in the city of Oakland. Of this number, in 36, or 62.1 per cent, the sanitary condition was reported as "good," and in 22, or 37.9 per cent, as "bad." The same report was made on ventilation.

TABLE I. Arrivals and Departures of Orientals, Port of San Francisco, during the Two Years ending September 30, 1910.

Race and year.	Asia.				Hawaiian Islands and Tahiti.				Net increase.	Net decrease.
	Arrivals.	Departures.	Increase.	Decrease.	Arrivals.	Departures.	Increase.	Decrease.		
Oct. 1, 1908, to Oct. 1, 1909:										
Japanese	589	2774		2185	45	24	21			2164
Chinese	7109	5461	1648		52	41	11		1659	
Koreans	9	12		3	5		5		2	
Totals	7707	8247		540	102	65	37			503
Oct. 1, 1909, to Oct. 1, 1910:										
Japanese	995	2850		1855	54	39	15			1840
Chinese	4979	5483		504	85	119		34		538
Koreans		8		8		1		1		9
Totals	5974	8341		2367	139	159		20		2387
Totals for two years:										
Japanese	1584	5624		4040	99	63	36			4004
Chinese	12088	10944	1144		137	160		23	1121	
Koreans	9	20		11	5	1	4			7
Totals	13681	16588		2907	241	224	17			2890

TABLE II. Hours of Labor and Wages Paid to Chinese by Chinese Employers in Stores and Factories in the CITY OF SAN FRANCISCO during the Fiscal Year 1909-10.

(Tabulated by Industries and Occupations.)

Industry and occupation.	Number of copartners.	Number of employees.	Hours per day.				Wages per week.								
			10	11	12	Over 12	Less than $3.00.	$3.00 to $5.99.	$6.00 to $8.99.	$9.00 to $11.99.	$12.00 to $14.99.	$15.00 to $17.99.	$18.00 to $20.99.	$21.00 to $24.99.	$25.00 and over.
Broom Manufacturing (3 establishments).															
Managers	2	2	2												
Bookkeepers	1	1	1												
Salesmen	18	18	18												
Broom makers		34	34					14	10		10				
Cooks		2	2						1		1				
Totals	21	57	57					14	11		11				
Cigar Manufacturing (7 establishments).															
Managers	5	5	3	2											
Bookkeepers	4	4	3		1										
Salesmen	6	6	3	3											
Packers and shippers		3	3							3					
Cigar makers		68	55	13					12	22	29	5			
Cooks		5	2	2	1				1	3	1				
Totals	15	91	69	20	2				13	28	30	5			
Clothing Manufacturing (10 establishments).															
Managers	9	9	9												
Bookkeepers	8	8	7			1									
Cutters		4			3	1					4				
Tailors		48	33		11	4				26	1	21			
Operators		40	40						40						
Salesmen	24	30	24		4	2				6					
Cooks		6	5		1					6					
Totals	41	145	118		19	8			40	38	5	21			

Drug Stores (2 establishments).															
Managers	4	4	4												
Clerks	8	8	8												
Porters		1	1							1					
Cooks		2	2							1	1				
Totals	12	15	15							2	1				
General Merchandise (43 establishments).															
Managers	48	48	32	8	7	1									
Bookkeepers	45	45	32	4	8	1									
Salesmen	165	213	162	3	32	16			1	47					
Porters and packers	3	59	36		15	8			21	30	5				
Cooks	7	34	24		4	6			2	15	9	1			
Totals	268	399	286	15	66	32			24	92	14	1			
Hardware, etc. (4 establishments).															
Managers	4	4	1	1	2										
Bookkeepers	4	4	1	1	2										
Salesmen		7			7					7					
Packers		11			6	5			2	9					
Cooks		2			1	1				2					
Totals	8	28	2	2	18	6			2	18					
Jewelers (5 establishments).															
Managers	5	5			5										
Bookkeepers	5	5			5										
Salesmen		8			6	2			1	7					
Jewelers		19	7		12					19					
Cooks		5			1	4			2	3					
Totals	10	42	7		29	6			3	29					
Ladies furnishings (13 establishments).*															
Managers	10	10	8	1	1										
Bookkeepers	15	15	10	1	3	1									
Salesmen		42	33		6	3			10	19	8		5		
Operators		72	55		12	5			11	55	6				
Packers		8	4		2	2		2	3	3					
Totals	25	147	110	2	24	11		2	24	77	14		5		

*8 female whites.

TABLE II. Hours of Labor and Wages Paid to Chinese by Chinese Employers in Stores and Factories in the CITY OF SAN FRANCISCO during the Fiscal Year 1909-10—Continued.

(Tabulated by Industries and Occupations.)

Industry and occupation.	Number of copartners.	Number of employees.	Hours per day.				Wages per week.								
			10	11	12	Over 12	Less than $3.00.	$3.00 to $5.99.	$6.00 to $8.99.	$9.00 to $11.99.	$12.00 to $14.99.	$15.00 to $17.99.	$18.00 to $20.99.	$21.00 to $24.99.	$25.00 and over.
Laundries (33 establishments).															
Managers	3	3			2	1									
Bookkeepers	7	7	1		2	4									
Markers		2	1			1			1	1					
Washers		68	24	12	20	12			2	27	37	2			
Ironers		177	47	34	76	20		4	16	92	65				
Drivers	11	21	6	6	8	1				1	8	1			
Cooks		9	2	2	1	4		1	6	2					
Totals	21	287	81	54	109	43		5	25	123	110	3			
Liquors (3 establishments).															
Managers	5	5	3		2										
Bookkeepers	4	4	4												
Salesmen	10	10	7		3										
Cooks	1	2	2							1					
Totals	20	21	16		5					1					
Markets—Meat, Fish, etc. (15 establishments).															
Managers	16	16	8	5	3										
Bookkeepers	21	22	7	5	10						1				
Salesmen	5	20	6		14				5	10					
Butchers		48	9	3	33	3			11	28	9				
Cooks		13	3		6	4			5	7	1				
Totals	42	119	33	13	66	7			21	45	11				

Newspapers and Printing (3 establishments).														
Managers	2	2	2											
Bookkeepers	6	6	6											
Compositors		20	20							20				
Pressmen		6	6							6				
Cooks		3	3							2	1			
Totals	8	37	37							28	1			
Oriental Bazaars (6 establishments).*														
Managers	9	9	8			1								
Bookkeepers	9	9	8			1								
Salesmen	43	85	78		3	4				33	9			
Porters		21	17		3	1			1	11	6			
Cooks		7	4		2	1			1	4	2			
Totals	61	131	115		8	8			5	48	17			
Restaurants (3 establishments).														
Managers	3	3	1		2									
Bookkeepers	6	7	3		3	1					1			
Cooks		9	3		4	2				2	5	2		
Kitchen help		7	3		2	2			4	3				
Waiters		12	5		4	3			8	4				
Totals	9	38	15		15	8			12	9	6	2		
Shoe Manufacturing (4 establishments).														
Managers	3	3	3											
Bookkeepers	2	2	1			1								
Salesmen	3	10	6			4			4	3				
Shoemakers		44	39			5			25	19				
Porters		4	2			2			4					
Cooks		2	2							2				
Totals	8	65	53			12			33	24				

*9 female whites.

TABLE III. Hours of Labor and Wages Paid to Chinese by Chinese Employers in Stores and Factories in the CITY OF OAKLAND during the Fiscal Year 1909-10.

(Tabulated by Industries and Occupations.)

Industry and occupation.	Number of copartners.	Number of employees.	Hours per day.				Wages per week.								
			10	11	12	Over 12	Less than $3.00.	$3.00 to $5.99.	$6.00 to $8.99.	$9.00 to $11.99.	$12.00 to $14.99.	$15.00 to $17.99.	$18.00 to $20.99.	$21.00 to $24.99.	$25.00 and over.
Cigar Manufacturing (5 establishments).															
Managers	7	7	7												
Bookkeepers	5	5	5												
Salesmen	14	14	14												
Cigar makers		48	48						37	11					
Cooks		5	5								5				
Totals	26	79	79						37	11	5				
General Merchandise (27 establishments).															
Managers	35	35	33	2											
Bookkeepers	27	27	26	1											
Salesmen	137	153	131	22						11	5				
Porters and packers	7	31	22	9			2		11	11					
Cooks	3	28	23	5						11	14				
Totals	209	274	235	39			2		11	33	19				
Laundries (2 establishments).															
Managers	3	3	2		1										
Ironers		18	9		9					18					
Washers		4	2		2					4					
Drivers	1	2	1		1					1					
Cooks		2	1		1					2					
Totals	4	29	15		14					25					

Markets—Meat, etc. (10 establishments).															
Managers	22	22	22												
Bookkeepers	9	9	9												
Salesmen	11	17	10	7					2	4					
Fishermen	8	8	8												
Porters and packers	2	6	3	3					3	1					
Cooks	2	6	3	2	1				1	3					
Butchers		21	21							21					
Totals	54	89	76	12	1				6	29					
Restaurants (6 establishments).															
Managers	6	6	3		3										
Bookkeepers	8	8	3	2	3										
Cooks	20	23	13	3	7				1	2					
Waiters	18	18	13		5										
Kitchen help		2		2				2							
Totals	52	57	32	7	18			2	1	2					
Tailors (5 establishments).															
Managers	6	6	6												
Bookkeepers	6	6	6												
Salesmen	16	16	16												
Operators		55	55						16	39					
Cooks		5	5								5				
Totals	28	88	88						16	39	5				
Miscellaneous (3 establishments).															
Managers	4	4	3		1										
Bookkeepers	3	3	2		1										
Salesmen	4	4	4												
Porters and packers	3	3	3												
Druggists	4	4			4										
Shoemakers	11	11	11												
Cooks	1	3	2		1					2					
Totals	30	32	25		7					2					

TABLE IV. Inspection of Chinese Stores and Factories in San Francisco.

Industry.	Number of establishments considered.	Total number of persons employed.	Sanitation.			Ventilation.		
			Good	Fair	Bad	Good	Fair	Bad
Broom manufacturing	3	57	3			3		
Cigar manufacturing	7	91	4	3		4	3	
Drugs	2	15	2			2		
Clothing manufacturing	10	145	5	5		5	5	
General merchandise	43	399	23	20		23	20	
Hardware, etc.	4	28		4			4	
Jewelry	5	42		5			5	
Ladies' furnishings	13	147	2	7	4	2	11	
Laundries	33	287	20	10	3	24	6	3
Liquors	3	21	3			3		
Markets, meat, etc.	15	119	3	12		3	12	
Newspapers and printing	3	37	3			3		
Oriental bazaars	6	131	2	4		2	4	
Restaurants	3	38		3			3	
Shoe manufacturing	4	65	2	2		2	2	
Totals	154	1622	72	75	7	76	75	3

TABLE V. Inspection of Chinese Stores and Factories in Oakland.

Industry.	Number of establishments considered.	Total number of persons employed.	Sanitation.			Ventilation.		
			Good	Fair	Bad	Good	Fair	Bad
Cigar manufacturing	5	79	4	1		4	1	
General merchandise	27	274	17	10		17	10	
Laundries	2	29	1	1		1	1	
Markets, meat, etc.	10	89	3	7		3	7	
Restaurants	6	57	3	3		3	3	
Tailors	5	88	5			5		
Miscellaneous	3	32	3			3		
Totals	58	648	36	22		36	22	

SOCIAL STATISTICS

SOCIAL STATISTICS

MISDEMEANORS.

Table I.

During the fiscal year ending June 30, 1909, 51,169 convictions for misdemeanors were reported in the State. Complete data on ages was only furnished in 28,223 instances. The latter figure has been used as a basis in drawing percentages. Of this number considered, 43, or 0.2 per cent, were under 15 years of age; 1,313, or 4.6 per cent, were between 15 and 20 years; 9,005, or 31.9 per cent, were between 20 and 30 years; 7,695, or 27.3 per cent, were between 30 and 40 years; 5,515, or 19.5 per cent, were between 40 and 50 years; and 4,652, or 16.5 per cent, were 50 years of age or over. Of the total number convicted, 49,277, or 96.3 per cent, were males, and 1,892, or 3.7 per cent, were females.

Table II.

Complete data on occupations was reported in 29,792 instances. Of the total number considered, 10,147, or 34.0 per cent, gave their occupations as laborers, 1,296, or 4.4 per cent, as sailors; and 1,179, or 4.0 per cent, were teamsters. Some of the other occupations which stand out prominently are cooks, 3.8 per cent; clerks, 3.1 per cent; carpenters, 2.5 per cent; housewives, 2.4 per cent; merchants, 2.1 per cent; painters, 2.0 per cent; domestics, 1.7 per cent; waiters, 1.7 per cent; and miners, 1.4 per cent. The twelve occupations enumerated above constituted 63.1 per cent of the total.

Table III.

The data on the nature of offense committed by persons convicted of misdemeanors is complete. 29,565, or 57.8 per cent, were convicted for drunkenness; 5,334, or 10.4 per cent, for vagrancy; 3,196, or 6.3 per cent, for disturbing the peace; 1,856, or 3.6 per cent, for petit larceny; 1,184, or 2.3 per cent, for gambling; and 774, or 1.5 per cent, for battery. These six offenses constituted 81.9 per cent of the total.

Table IV.

Data on the length of sentence was complete in 38,392 instances. Of this number, 511, or 1.3 per cent, were sentenced to serve 3 days or less; 896, or 2.3 per cent, from 4 to 5 days; 2,314, or 4.5 per cent, from 6 to 10 days; 3,351, or 8.7 per cent, from 11 to 30 days; 880, or 2.3 per cent, from 31 to 60 days; 1,826, or 4.8 per cent, over 60 days; 5,212, or 13.6 per cent, were fined; 2,910, or 7.6 per cent, forfeited their bail and in 20,475 instances, or 53.4 per cent, sentence was suspended.

Table V.

During the fiscal year ending June 30, 1910, 50,777 convictions for misdemeanors were reported in the State. Complete data on ages was furnished in 28,438 instances. Of this number, 976, or 3.4 per cent, were between 15 and 20 years of age; 8,482, or 29.8 per cent, between 20 and 30 years; 7,803, or 27.5 per cent, between 30 and 40 years; 5,993, or 21.1 per cent, between 40 and 50 years; and 5,178, or 18.2 per cent, were 50 years of age and over. Of the total number convicted, 48,382, or 95.3 per cent, were males, and 2,395, or 4.7 per cent, were females.

Table VI.

Complete data on occupations was secured in 28,772 instances. Of this number, 10,379, or 36.1 per cent, gave their occupation as laborers; 1,292, or 4.5 per cent, as cooks; 1,190, or 4.1 per cent, as sailors; and 1,085, or 3.8 per cent, as teamsters. Some of the other occupations which stand out prominently are: Carpenters, 2.5 per cent; clerks, 2.4 per cent; housewives, 2.1 per cent; waiters, 2.0 per cent; painters, 2.0 per cent; miners, 1.9 per cent; domestics, 1.9 per cent, and merchants, 1.5 per cent. The twelve occupations enumerated above constituted 64.8 per cent of the total.

Table VII.

The data on nature of offense committed by persons convicted of misdemeanors is complete. 29,792, or 58.7 per cent, were convicted for drunkenness; 4,803, or 9.4 per cent, for vagrancy; 3,315, or 6.5 per cent, for disturbing the peace; 1,669, or 3.3 per cent, for petit larceny; 1,158 or 2.3 per cent for gambling, and 739, or 1.5 per cent, for battery. The convictions for these six offenses make up 81.7 per cent of the total convictions.

Table VIII.

Data on the length of sentence is complete in 37,700 instances. Of this number, 711, or 1.9 per cent, were sentenced to serve 3 days or less; 1,056, or 2.8 per cent, from 4 to 5 days; 2,668, or 7.1 per cent, from 6 to 10 days; 3,485, or 9.3 per cent, from 11 to 30 days; 1,014, or 2.7 per cent, from 31 to 60 days; 1,724, or 4.6 per cent, over 60 days; 3,968, or 10.5 per cent, were fined; 3,061, or 8.1 per cent, forfeited their bail, and in 19,997 instances, or 53.1 per cent, sentence was suspended.

The total number of convictions for misdemeanors decreased from 53,400 for the fiscal year 1906–07, to 50,777 for the fiscal year 1909-10. Persons 30 years of age and over made up 65.3 per cent of the total for the fiscal year 1906–07; 62.8 per cent for the fiscal year 1907–08; 63.3

per cent for the fiscal year 1908–09; 66.8 per cent for the fiscal year 1909–10. In occupations, laborers constituted 38.0 per cent for the fiscal year 1906–07; 37.2 per cent for the fiscal year 1907–08; 34.0 per cent for the fiscal year 1908–09; 36.1 per cent for the fiscal year 1909–10. The twelve occupations—laborers, cooks, sailors, teamsters, carpenters, clerks, housewives, waiters, painters, miners, domestics, and merchants—made up 65.4 per cent of the total for the fiscal year 1906–07; 63.7 per cent for the fiscal year 1907–08; 63.1 per cent for the fiscal year 1908–09; 64.8 per cent for the fiscal year 1909–10. The most common offense was drunkenness. During the fiscal year 1906–07, 65.0 per cent of the total convictions was for drunkenness. For the fiscal year 1907–08, 58.0 per cent; for the fiscal year 1908–09, 57.8 per cent; for the fiscal year 1909–10, 58.7 per cent. The six offenses—drunkenness, vagrancy, disturbing the peace, petit larceny, gambling, and battery—made up 86.2 per cent of the total in the fiscal year 1906–07; 87.7 per cent in the fiscal year 1907–08; 81.9 per cent in the fiscal year 1908–09; 81.7 per cent in the fiscal year 1909–10.

FELONIES.

Table I.

For the fiscal year ending June 30, 1909, 1,017 convictions for felonies were reported. These represent only those persons convicted of felonies, and committed to the state penitentiaries. Those sent to reform schools and those admitted to probation are treated in separate tables. Of the total number under consideration, 73, or 7.2 per cent, were between 15 and 20 years of age; 497, or 48.9 per cent, were between 20 and 30 years; 255, or 25.1 per cent, were between 30 and 40 years; 129, or 12.7 per cent, were between 40 and 50 years; 62, or 6.1 per cent, were 50 years or over. Only 6 females were convicted of felonies.

Table II.

Two hundred and forty, or 23.6 per cent, of the persons convicted gave their occupation as laborers. Some of the other occupations that stand out prominently are cooks, 7.3 per cent; carpenters, 4.5 per cent; teamsters, 4.5 per cent; waiters, 4.0 per cent; farmers, 3.0 per cent; miners, 2.8 per cent; machinists, 2.8 per cent; painters, 3.8 per cent; clerks, 2.6 per cent. These ten occupations constituted 57.9 per cent of the total.

Table III.

The most common offense was burglary, 368 persons, or 36.2 per cent, being convicted of this crime. 143, or 14.1 per cent, were convicted of grand larceny; 91, or 9.0 per cent, of forgery; 67, or 6.6 per cent, of robbery; 58, or 5.7 per cent, of assault; 41, or 4.0 per

cent, of murder; and 41, or 4.0 per cent, of rape. The persons convicted of these seven offenses made up 79.6 per cent of the total.

Table IV.

Of the total number of persons convicted, 186, or 18.3 per cent, were sentenced to serve less than 2 years; 519, or 51.0 per cent, to serve from 2 to 5 years; 183, or 18.0 per cent, from 6 to 10 years; 66, or 6.5 per cent, from 11 to 20 years; 24, or 2.4 per cent, over 20 years, while 32, or 3.1 per cent, were given life sentences, and 7 were condemned to death.

Table V.

For the fiscal year ending June 30, 1910, 978 convictions for felonies were reported. Of this number, 71, or 7.3 per cent, were between 15 and 20 years of age; 421, or 43.0 per cent, were between 20 and 30 years; 260, or 26.6 per cent, were between 30 and 40 years; 138, or 14.1 per cent, were between 40 and 50 years, and 88, or 9.0 per cent, were 50 years or over.

Table VI.

Two hundred and seven persons, or 21.2 per cent of the total, gave their occupations as laborers; 68, or 6.9 per cent, as cooks; 46, or 4.7 per cent, as carpenters; 42, or 4.3 per cent, as waiters; 39, or 3.9 per cent, as teamsters; 35, or 3.6 per cent, as clerks; 28, or 2.9 per cent, as machinists; 28, or 2.9 per cent, as miners; 26, or 2.7 per cent as painters, and 26, or 2.7 per cent, as bookkeepers. These ten occupations made up 55.8 per cent of the total.

Table VII.

The most common offense was burglary. 363, or 37.1 per cent of the total, were convicted of this crime; 130, or 13.3 per cent, were convicted of grand larceny; 84, or 8.6 per cent, for forgery; 77, or 7.9 per cent, for robbery; 56, or 5.7 per cent, for assault; 39, or 4.0 per cent, for murder; 26, or 2.7 per cent, of rape. These seven offenses constitute 79.3 per cent of the total.

Table VIII.

Of the total number of persons convicted, 179, or 18.3 per cent, were sentenced to serve less than 2 years; 532, or 54.4 per cent, to serve from 2 to 5 years; 156, or 16.0 per cent, from 6 to 10 years; 57, or 5.8 per cent, from 11 to 20 years; 21, or 2.1 per cent, over 20 years, while 28, or 2.9 per cent, were given life sentences, and 5 were condemned to death.

Table IX.

For the fiscal year ending June 30, 1909, three counties failed to report the number of persons convicted of felonies and admitted to

probation. In the counties reporting, 226 persons were admitted to probation. Of this number, 218 were males and 8 were females. For the fiscal year ending June 30, 1910, nine counties failed to report. In the counties reporting, 348 persons were admitted to probation. Of this number, 337 were males and 11 females.

DIVORCE.

Table I.

In presenting statistics on divorce, only final decrees have been considered, no account being taken of interlocutory decrees.

During the fiscal year ending June 30, 1909, 22,244 marriages were recorded in the State of California. During the same period there were granted 3,087 final decrees of divorce, the percentage of divorce to marriage being 13.9 per cent, or more than one divorce to every eight marriages. In the county of San Francisco, there were 4,055 marriages and 802 divorces, or practically one divorce to every five marriages. In Los Angeles County, there were 4,667 marriages and 686 divorces, or about one divorce to every seven marriages. In Alameda County, there were 2,453 marriages and 328 divorces, or more than one divorce to every eight marriages. Alpine County was the only county in which no divorces were granted. Marin County had 801 marriages and only 18 divorces, or less than one divorce to every 45 marriages.

Of a total of 3,087 divorces granted in the State, husbands were plaintiffs in 846 instances, or 27.4 per cent, while wives were plaintiffs in 2,241 instances, or 72.6 per cent. In the county of San Francisco 27.2 per cent of the actions were brought by the husband, and 72.8 per cent by the wife. In Los Angeles County 29.2 per cent were brought by the husband, and 70.8 per cent by the wife. In Alameda County 25.9 per cent were brought by the husband, and 74.1 per cent by the wife.

Of the total number of couples to whom divorces were granted, 2,036, or 65.9 per cent, were married in California; 823 couples, or 26.7 per cent, were married in the United States, excluding California; 124 couples, or 4.0 per cent, were married in foreign countries, while in 104 instances the place of marriage was not stated.

In San Francisco County, 65.7 per cent were married in California, and 21.9 per cent in the United States outside of California. In Los Angeles County only 51.8 per cent were married in California and 41.6 per cent in the United States outside of California.

Table II.

Divorces were granted to couples married less than five years in 570 instances; to couples married five to ten years in 1,249 instances; to couples married eleven to twenty years in 835 instances; and to couples married over twenty years in 411 instances, representing respectively 18.5 per cent; 40.5 per cent; 27.0 per cent; and 13.3 per cent of the total. Of couples married over ten years, the State shows 40.3 per cent, while the county of San Francisco shows 39.4 per cent, the county of Los Angeles 39.8 per cent, and the county of Alameda 38.7 per cent.

Table III.

Of the total number of divorces, 182 or 5.9 per cent, were granted for adultery; 919, or 29.8 per cent, for extreme cruelty; 1,378 or 44.6 per cent, for wilful desertion; 477 or 15.4 per cent, for neglect and failure to provide; 104 or 3.4 per cent, for intemperance; and 27 or 0.9 per cent for conviction of a felony.

Table IV.

Of a total of 3,087 couples to whom divorces were granted, 1,857 or 60.2 per cent, were without children. In the county of San Francisco 63.1 per cent were without children. In the county of Los Angeles 64.0 per cent, and in the county of Alameda 57.0 per cent. In the State there were about seven minor children to every ten divorces. In the county of San Francisco, about six children to every ten divorces. In the county of Los Angeles, about six children to every ten divorces, and in Alameda County, about seven children to every ten divorces. There were 2,128 minor children affected by the granting of divorces. Of this number, 493, or 23.2 per cent were less than five years of age. 766, or 36.0 per cent, from five to ten years of age; and 711, or 33.4 per cent, were over ten years. In 158 instances the ages were not given.

Table V.

During the fiscal year ending June 30, 1910, 23,645 marriages were recorded. During the same period 3,334 final decrees of divorce were granted, the percentage of divorce to marriage being 14.1 per cent, or about one divorce to every seven marriages. In the county of San Francisco, there were 4,327 marriages and 874 divorces, or one divorce to every five marriages. In Los Angeles County there were 5,110 marriages and 776 divorces, or one divorce to every seven marriages. In Alameda County there were 2,496 marriages and 417 divorces, or one divorce to every six marriages. In Alpine and Mono counties no divorces were granted.

Of a total of 3,334 divorces granted in the State, husbands were plaintiffs in 906 instances, or 27.2 per cent, while wives were plaintiffs in 2,428 instances, or 72.8 per cent. In San Francisco County 30.5 per

cent of the actions were brought by the husband, and 69.5 per cent by the wife.

In Los Angeles County 25.4 per cent were brought by the husband and 74.6 per cent by the wife. In Alameda County 25.9 per cent were brought by the husband and 74.1 per cent by the wife.

Of the total number of couples to whom divorces were granted, 2,148, or 64.4 per cent, were married in California; 881 couples, or 26.4 per cent, were married in the United States excluding California; 152, or 4.6 per cent, were married in foreign countries, while in 153 instances the place of marriage was not stated. In San Francisco County 66.1 per cent were married in California and 21.9 per cent in the United States outside of California, while in Los Angeles County only 50.4 per cent were married in California and 41.2 per cent in the United States outside of California.

Table VI.

Divorces were granted to couples married less than five years in 683 instances; to couples married from 5 to 10 years in 1,306 instances; to couples married 11 to 20 years in 886 instances; and to couples married over 20 years in 425 instances, representing, respectively, 20.5 per cent, 39.2 per cent, 26.6 per cent, and 12.7 per cent of the total. Of couples married over ten years the State shows 39.3 per cent, while in the county of San Francisco they represent 34.4 per cent; in Los Angeles County 39.4 per cent; and in Alameda County 42.0 per cent.

Table VII.

Of the total number of divorces granted, 139, or 4.2 per cent, were for adultery; 999, or 30.0, for extreme cruelty; 1,566, or 47.0, for wilful desertion; 465, or 13.9 per cent, for neglect and failure to provide; 135 or 4.0 per cent, for intemperance; and 30, or 0.9 per cent, for conviction of a felony.

Table VIII.

Of the total number of 3,334 couples to whom divorces were granted, 2,041, or 61.2 per cent, were without children. In San Francisco County 68.3 per cent were without children; in Los Angeles County, 67.3 per cent; and in Alameda County 54.7 per cent. In the State there were about seven minor children to every ten divorces; in the county of San Francisco about five; in Los Angeles County about six; and in Alameda County about seven. There were 2,242 minor children affected by the granting of divorces. Of this number, 585, or 26.1 per cent, were less than five years of age; 838, or 37.4 per cent, were from 5 to 10 years; and 703, or 31.3 per cent, were over 10 years. In 116 instances the ages were not given.

In the table following is given the number of marriages and divorces in the State of California for the four fiscal years ending June, 30, 1910:

Fiscal year.	Number of Marriages.	Number of divorces.	Percentage of divorce to marriage.
1906-07	22,734	2,177	9.6
1907-08	22,238	2,783	12.5
1908-09	22,244	3,087	13.9
1909-10	23,645	3,334	14.1

During the four years ending June 30, 1910, the number of marriages in the State increased but 4.0 per cent, whereas the number of divorces increased 53.1 per cent. The ratio of divorce to marriage grew from about one divorce to every ten marriages in the fiscal year 1906-07 to one divorce in every seven marriages in the fiscal year 1909–10. In the county of San Francisco the number of marriages increased 12.0 per cent, whereas the number of divorces increased 74.8 per cent. The ratio of divorce to marriage increased from about one divorce to every eight marriages in the fiscal year 1906–07 to one divorce in every five marriages in the fiscal year 1909–10. In the county of Los Angeles the number of marriages increased 5.1 per cent, whereas the number of divorces increased 46.4 per cent. The ratio of divorce to marriage increased from about one divorce to every eleven marriages in the fiscal year 1906–07, and over one divorce to every seven marriages in the fiscal year 1909–10.

In the county of Alameda the number of marriages decreased 21.2 per cent, whereas the number of divorces increased 129.0 per cent. The ratio of divorce to marriage increased from about one divorce to every eighteen marriages in the fiscal year 1906–07 to about one divorce to every six marriages in the fiscal year 1909–10.

TABLE I. Ages of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909. (Tabulated by Counties.)

Counties.	Total number of misdemeanors	Ages.							Sex.	
		Under 15 years	15 to 19 years	20 to 29 years	30 to 39 years	40 to 49 years	50 years and over	Unknown	Total females	Total males
Alameda	7503	29	342	1796	1730	1318	1044	1244	688	6815
Alpine (no convictions).										
Amador	28		1	13	7	2	5		1	27
Butte	936		4	46	34	25	22	805	2	934
Calaveras	7			2	4		1			7
Colusa	61		1	5	5	4	3	43	1	60
Contra Costa	317	1	38	117	49	28	8	76		317
Del Norte	3				2	1				3
El Dorado	27							27	1	26
Fresno	771		32	256	214	159	110		5	766
Glenn	22			11	7	4				22
Humboldt	255			21	15	7	2	210	1	254
Imperial	42		7	21	8	5	1			42
Inyo	58			14	6	21	15	2	1	57
Kern	389		4	155	124	39	29	38		389
Kings	355		13	62	21	14	22	223		355
Lake	13			3	1	3	6			13
Lassen	9			2	2	3	2			9
Los Angeles	14498	3	155	561	323	166	204	13086	12	14486
Madera	152			24	32	16	34	46		152
Marin	187			1		1	2	183	1	186
Mariposa	4		1	1			2			4
Mendocino	55		2	15	12	9	17			55
Merced	129		2	35	50	34	8			129
Modoc	23		3	8	7	3	2		1	22
Mono	8			2	1	2	3			8
Monterey	242		12	67	42	22	7	92	5	237
Napa	158		3	15	26	17	47	50		158
Nevada	46		1	13	9	8	4	11		46
Orange	195		23	65	54	17	11	25		195
Placer	314		34	96	67	36	15	66		314
Plumas	30		2	5	3	6	6	8		30
Riverside	216		1	10	3	2	3	197		216
Sacramento	2412		18	111	89	61	43	2090	85	2327
San Benito	18			5	6	7				18
San Bernardino	1136		56	335	171	79	25	470	8	1128
San Diego	995		14	64	33	25	23	836	4	991
San Francisco	13620	4	400	4131	3763	2814	2478	30	994	12626
San Joaquin	188	1	24	80	40	18	10	15		188
San Luis Obispo	244		3	55	39	35	2	110		244
San Mateo	166	1	1	20	75	49	13	7	4	162
Santa Barbara	506		26	98	67	50	27	238	7	499
Santa Clara	1442	4	52	310	292	240	276	268	63	1379
Santa Cruz	278		2	42	30	20	23	161	2	276
Shasta	114		6	46	33	21	8			114
Sierra	1					1				1
Siskiyou	29		4	7	6	4	3	5		29
Solano	766		4	75	28	16	25	618	1	765
Sonoma	548		1	10	17	14	9	497		548
Stanislaus	75			9	12	8	7	39		75
Sutter	5			1	1		1	2		5
Tehama	249			2	2	1	4	240		249
Trinity	5							5		5
Tulare	336			38	43	28	5	222		336
Tuolumne	14		1	5		5	1	2		14
Ventura	141		10	56	37	22	5	11		141
Yolo	65		5	22	17	9	12		2	63
Yuba	763		5	41	36	16	17	648	3	760
Totals	51169	43	1313	9005	7695	5515	4652	22946	1892	49277

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909. (Tabulated by Counties.)

Counties.	Total number of misdemeanors.	Agents.	Bakers.	Barbers.	Bartenders.	Blacksmiths.	Boiler makers.
Alameda	7503	77	39	57	38	40	16
Alpine (no convictions).							
Amador	28					1	
Butte	936		1	1	1	5	1
Calaveras	7						
Colusa	61						
Contra Costa	317		4		1		2
Del Norte	3						
El Dorado	27						
Fresno	771		1	4	1	6	2
Glenn	22					2	
Humboldt	255					1	
Imperial	42						
Inyo	58					1	
Kern	389						
Kings	355						
Lake	13						
Lassen	9			1			
Los Angeles	14498		3	6		8	3
Madera	152					3	
Marin	187						
Mariposa	4						
Mendocino	55				1	4	
Merced	129		1		1		
Modoc	23					1	
Mono	8						
Monterey	242		1		2	1	1
Napa	158			1		1	
Nevada	46				2		
Orange	195				2	2	
Placer	314		2		5	3	
Plumas	30					1	
Riverside	216						
Sacramento	2412		3	6	3	3	5
San Benito	18						
San Bernardino	1136		2	5	5	2	4
San Diego	995		1		2	2	1
San Francisco	13620	51	104	86	112	100	78
San Joaquin	188						
San Luis Obispo	244						
San Mateo	166		2	2	5	2	
Santa Barbara	506		1	4		5	2
Santa Clara	1442	16	5	7	7	3	1
Santa Cruz	278				1		2
Shasta	114					1	
Sierra	1						
Siskiyou	29						
Solano	766			1	2	1	1
Sonoma	548			1			
Stanislaus	75						
Sutter	5						
Tehama	249				1		
Trinity	5						
Tulare	336						
Tuolumne	14				1	2	
Ventura	141			1			
Yolo	65					1	1
Yuba	763		1	2			3
Totals	51169	144	171	185	193	202	123

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Bookkeepers.	Bricklayers.	Butchers.	Carpenters.	Cement workers.	Chauffeurs.	Cigar makers.	Clerks.	Conductors.
Alameda	31	24	41	219	20	144	37	395	26
Alpine (no convictions).									
Amador									
Butte				1					
Calaveras									
Colusa									
Contra Costa		1	3	11		2		1	
Del Norte									
El Dorado									
Fresno	3	4	4	9		2	1	1	
Glenn									
Humboldt		1							
Imperial								1	
Inyo				1					
Kern									
Kings									
Lake									
Lassen									
Los Angeles	6		1	17		1	4	8	
Madera				2					
Marin				3					
Mariposa			1						
Mendocino	1			1				1	
Merced				3					
Modoc									
Mono									
Monterey				1				1	
Napa	1							1	
Nevada				1			1		
Orange			1	1					
Placer			1	3				3	
Plumas									
Riverside		1							
Sacramento		1	2	8			2	4	
San Benito									
San Bernardino	2	1	2	7		1	5		
San Diego	1		1	7			1	3	
San Francisco	63	71	86	384	57	142	33	484	23
San Joaquin				1				1	
San Luis Obispo									1
San Mateo		2	2	11				2	
Santa Barbara	2		1	8				3	
Santa Clara	1	3	4	18	4			16	1
Santa Cruz	1							1	
Shasta		1		2					
Sierra									
Siskiyou									
Solano	1			5				1	
Sonoma			1	2					
Stanislaus				1					
Sutter									
Tehama									
Trinity									
Tulare				1				1	
Tuolumne									
Ventura									
Yolo		1	1	2					
Yuba			3	1					
Totals	113	111	155	731	81	292	84	928	51

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Conductors.	Cooks.	Domestics.	Electricians.	Engineers.	Expressmen.	Farmers.	Firemen.	Gamblers.
Alameda	57	483	271	45	62	13	55	40	278
Alpine (no convictions).									
Amador									
Butte		6							
Calaveras									
Colusa									
Contra Costa		16			3		1	8	
Del Norte									
El Dorado			1				1		
Fresno		11		1	5	2	6	5	
Glenn									
Humboldt		1			2				
Imperial									
Inyo		3	1				2		
Kern									
Kings									
Lake					1				
Lassen		1							
Los Angeles	1	37	3	10	5	1	24	11	
Madera		1					2		
Marin									
Mariposa									
Mendocino		1					3		
Merced				2					
Modoc			1						
Mono									
Monterey		7		2	1		1	2	
Napa		2			1		5		
Nevada		2		1					
Orange		3		1			2	1	
Placer		9		1	3			1	2
Plumas									
Riverside									
Sacramento		16		3	6		1	4	
San Benito									
San Bernardino		13		1	1		4	5	
San Diego		2					1	1	
San Francisco	63	465	215	87	104	19	52	187	
San Joaquin		3						2	
San Luis Obispo									
San Mateo		2	1	1			7		
Santa Barbara		9	1	4	3		2	2	
Santa Clara	1	19	11		4	1	6	2	
Santa Cruz		3		1			1		
Shasta		1					1		
Sierra									
Siskiyou							1		
Solano		8	1				1	2	
Sonoma		3					7		
Stanislaus									
Sutter							2		
Tehama							4		
Trinity							1		
Tulare							2		
Tuolumne		1					1		
Ventura		2							
Yolo		5		1				1	
Yuba		5		1	1		1		
Totals	122	1140	506	162	202	36	197	274	280

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Gardeners	Hodcarriers	Hostlers	Housewives	Iron workers	Janitors	Laborers	Laundry workers	Machinists
Alameda	70	21	48	177	27	16	1411	224	95
Alpine (no convictions).									
Amador							10		
Butte		1	2				88		1
Calaveras							2		
Colusa							16		
Contra Costa					7		90	1	4
Del Norte							3		
El Dorado							21		
Fresno			1		3		566		10
Glenn							19		
Humboldt	1		1			1	27		1
Imperial							32		
Inyo							42		
Kern							351		
Kings							132		
Lake							12		
Lassen							6		
Los Angeles	3	1	1	3	1	2	844		12
Madera	1		1				72		
Marin							5		
Mariposa							3		
Mendocino	1						19		
Merced			1		1		88		
Modoc							18		
Mono							5		
Monterey							88		
Napa				1			57		
Nevada							11		
Orange							121		3
Placer	1				2		196		2
Plumas							25		
Riverside							17		
Sacramento			2		1	1	149		9
San Benito							16		
San Bernardino			1		4		438		19
San Diego					1		76	2	1
San Francisco	36	33	33	525	157	36	3157	98	187
San Joaquin							171		
San Luis Obispo							132		
San Mateo	6		9	2	1		64	3	3
Santa Barbara	2		1				119		8
Santa Clara	4	1	1	5	1	2	723	2	3
Santa Cruz					1		68		1
Shasta							101		2
Sierra									
Siskiyou									
Solano	1						56		3
Sonoma				1		1	45		
Stanislaus							33		
Sutter							2		
Tehama							83		
Trinity							1		
Tulare							125	2	
Tuolumne							2		
Ventura							127		
Yolo							25		2
Yuba		1	3		1		37		3
Totals	126	58	105	714	211	59	10147	332	368

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Merchants.	Millhands.	Milkmen.	Miners.	Molders.	Motormen.	No occupation.	Painters.	Peddlers.
Alameda	303	32	3	57	25	3	353	161	118
Alpine (no convictions).									
Amador				11				1	2
Butte				5				1	1
Calaveras				5					
Colusa									
Contra Costa		1		6	1			6	2
Del Norte									
El Dorado	2			2					
Fresno	1			12	1		6	10	1
Glenn							1		
Humboldt		2					6	1	
Imperial							5	1	
Inyo				6					
Kern									
Kings									
Lake									
Lassen									
Los Angeles				51	11		14	32	12
Madera				1			3		2
Marin	1		1				130		
Mariposa									
Mendocino				2			3	2	
Merced				17			3	1	
Modoc									
Mono				3					
Monterey				1			2	3	
Napa				2	1		1		
Nevada				5					
Orange				2				3	
Placer				18	1		5	4	4
Plumas				3					
Riverside									
Sacramento			1	10			10	3	1
San Benito							1		
San Bernardino				27	3		4	4	
San Diego				6	1		8	3	
San Francisco	321	18	67	125	61	21	361	296	224
San Joaquin				1					
San Luis Obispo							1	1	
San Mateo		2			4			3	
Santa Barbara		1		7	4		3	6	
Santa Clara	4	1		5	5		23	29	16
Santa Cruz		2		3	2		3	7	1
Shasta				1				1	
Sierra									
Siskiyou				1			15	2	
Solano				4	2		1	10	
Sonoma	3						3	1	2
Stanislaus	1			1					
Sutter									1
Tehama				1					
Trinity				3					
Tulare							4		
Tuolumne				4					
Ventura									
Yolo	1			4	1			1	
Yuba				6	1			3	
Totals	637	59	72	418	124	24	969	596	387

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Plasterers	Plumbers	Porters	Printers	Restaurant keepers	Sailors	Salesmen	Saloon keepers	Shoe makers
Alameda	42	72	47	51	7	209	95	9	25
Alpine (no convictions).									
Amador								1	
Butte				1					
Calaveras									
Colusa									
Contra Costa	1	2	2			14			
Del Norte									
El Dorado									
Fresno		4	1	3	1	2	1	1	3
Glenn									
Humboldt						4			
Imperial					1				
Inyo									
Kern									
Kings									
Lake									
Lassen									
Los Angeles		4	5	3	2	39	1		6
Madera		1	1						1
Marin									
Mariposa									
Mendocino		1				1			
Merced			1			1			1
Modoc									
Mono									
Monterey				1		1			
Napa		1		1		2			
Nevada								1	1
Orange						4			
Placer		1		1		3			
Plumas									
Riverside									
Sacramento			3	1		8	1		4
San Benito									
San Bernardino		4	1	11		8		1	3
San Diego						8	1		
San Francisco	89	113	74	127	118	954	121	27	73
San Joaquin			3			2			
San Luis Obispo						1			
San Mateo	2	2				1		1	
Santa Barbara	1	4	1	1		4			
Santa Clara	1	6		7		10	2	1	1
Santa Cruz						3	1		
Shasta									
Sierra									
Siskiyou									1
Solano		1	2			16			1
Sonoma	1								
Stanislaus				1					
Sutter									
Tehama									
Trinity									
Tulare								1	
Tuolumne									
Ventura									
Yolo		1		1	2	1			1
Yuba	1	2							
Totals	138	219	141	210	131	1296	223	43	121

TABLE II. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Soldiers.	Stevedores.	Stonecutters.	Tailors.	Teamsters.	Tinners.	Unclassified.	Unknown.	Waiters.
Alameda	18	39	9	79	277	12	766	------	94
Alpine (no convictions).									
Amador	------	------	------	------	------	------	1	1	------
Butte	------	------	------	------	6	------	7	805	2
Calaveras	------	------	------	------	------	------	------	------	------
Colusa	------	------	------	------	------	------	2	43	------
Contra Costa	------	------	------	------	12	1	30	77	7
Del Norte	------	------	------	------	------	------	------	------	------
El Dorado	------	------	------	------	------	------	------	------	------
Fresno	------	1	1	5	9	2	50	------	8
Glenn	------	------	------	------	------	------	------	------	------
Humboldt	------	1	------	------	------	------	13	192	------
Imperial	------	------	1	------	------	------	1	------	------
Inyo	------	------	------	------	------	------	2	------	------
Kern	------	------	------	------	------	------	1	37	------
Kings	------	------	------	------	------	------	------	223	------
Lake	------	------	------	------	------	------	------	------	------
Lassen	------	------	------	------	------	------	1	------	------
Los Angeles	57	3	4	5	30	3	97	13080	23
Madera	------	------	------	2	5	------	5	48	1
Marin	2	------	------	------	------	2	------	43	------
Mariposa	------	------	------	------	------	------	------	------	------
Mendocino	------	------	------	------	6	------	8	------	------
Merced	------	------	------	------	5	------	3	------	------
Modoc	------	------	------	------	------	------	3	------	------
Mono	------	------	------	------	------	------	------	------	------
Monterey	1	------	------	1	6	------	24	93	1
Napa	21	------	1	------	2	------	6	50	------
Nevada	------	------	------	------	3	------	3	11	4
Orange	------	------	------	------	1	------	21	25	1
Placer	1	------	------	1	3	1	22	14	1
Plumas	------	------	------	1	------	------	------	------	------
Riverside	------	------	------	------	------	------	1	197	------
Sacramento	------	------	3	1	8	------	36	2086	7
San Benito	------	------	------	------	------	------	1	------	------
San Bernardino	------	------	1	4	25	3	38	472	5
San Diego	2	1	------	------	3	------	20	834	5
San Francisco	283	133	39	125	726	21	1430	27	318
San Joaquin	------	------	------	------	------	------	4	------	------
San Luis Obispo	1	------	------	------	------	------	2	105	------
San Mateo	------	------	1	------	12	1	6	4	------
Santa Barbara	------	1	3	2	1	1	32	253	4
Santa Clara	1	1	------	2	14	1	73	358	9
Santa Cruz	------	------	1	------	3	------	20	151	1
Shasta	------	------	------	1	------	------	1	------	1
Sierra	------	------	------	------	------	------	------	1	------
Siskiyou	------	------	------	------	------	------	3	6	------
Solano	6	------	------	------	2	1	18	617	1
Sonoma	------	1	------	1	5	------	3	467	------
Stanislaus	------	------	------	------	------	------	------	38	------
Sutter	------	------	------	------	------	------	------	------	------
Tehama	------	------	------	------	------	------	------	160	------
Trinity	------	------	------	------	------	------	------	------	------
Tulare	------	------	------	------	------	------	1	199	------
Tuolumne	------	------	------	------	------	------	2	------	1
Ventura	------	------	------	------	------	------	------	11	------
Yolo	------	------	------	------	1	------	8	------	3
Yuba	------	------	1	2	14	------	14	648	5
Totals	393	181	65	232	1179	49	2779	21377	502

TABLE III. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909.
(Tabulated by Counties.)

Counties.	Total number of misdemeanors	Assault	Auto laws	Battery	Beating the railroad	Begging	Bicycle ordinance	City and county ordinances not specified	Concealed weapons	Contempt of court
Alameda	7503	9	348	119	4	53	122	406	58	3
Alpine (no convictions.)										
Amador	28	2		2					1	
Butte	936	1		10						
Calaveras	7			4						
Colusa	61	1		1				1		1
Contra Costa	317	2		5	115			1		1
Del Norte	3			1						
El Dorado	27	2		1						
Fresno	771	4		17		19		1	6	1
Glenn	22									
Humboldt	255	3		3						
Imperial	42	4		2						
Inyo	58	1		4						
Kern	389	6		4						
Kings	355	3		6						
Lake	13	2								
Lassen	9			1						
Los Angeles	14498	6		197		77	107	455	123	7
Madera	152	4		1		10				
Marin	187	2		3					1	
Mariposa	4	1								
Mendocino	55	1								
Merced	129	6		1						
Modoc	23			2						
Mono	8									
Monterey	242			2					1	
Napa	158	3		1						1
Nevada	46	4		6					1	
Orange	195			4				3		1
Placer	314	6		1	1			3		
Plumas	30	1							1	
Riverside	216	3								
Sacramento	2412	7		48				56	8	
San Benito	18									
San Bernardino	1136	12		17	104				3	
San Diego	995	2		14	3	1		4		2
San Francisco	13620	22	20	206	50	245		922	86	2
San Joaquin	188	6		5	3			4		
San Luis Obispo	244			2						
San Mateo	166	3		2						1
Santa Barbara	506	1		2						
Santa Clara	1442	8	12	33		29	150	12	3	1
Santa Cruz	278			1						
Shasta	114	8		2						
Sierra	1									
Siskiyou	29	1		3					1	
Solano	766	3		5					1	
Sonoma	548	2		13		1				
Stanislaus	75	1		1						
Sutter	5			3				1		
Tehama	249	3		3						
Trinity	5			2						
Tulare	336			3						
Tuolumne	14									
Ventura	141	10		2				5	1	
Yolo	65			2		1				
Yuba	763	4		7				2	3	6
Totals	51169	170	380	774	280	436	379	1876	298	27

TABLE III. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued.
(Tabulated by Counties.)

Counties.	Cruelty to animals	Defaulting witness	Defrauding an innkeeper	Discharging firearms	Disturbing the peace	Drunk	Embezzlement	Failure to provide	Fast driving	Fish and game laws
Alameda	18	4	4	8	209	3735	12	6	6	19
Alpine (no convictions.)										
Amador			1		10					
Butte			2		61	805	2			
Calaveras			1							
Colusa					4	43				
Contra Costa			4		40	48	1			
Del Norte			1							
El Dorado					18					
Fresno	1		2		155	186	5	1		
Glenn			1		3	6				
Humboldt			2		16	191	1	1		2
Imperial			1		2		1			
Inyo					20					
Kern	1				78	37	1			
Kings					25	239				
Lake					7					
Lassen	1		1			1				
Los Angeles	228		2	9	691	8453	9		524	1
Madera					62	50		1		
Marin					166					
Mariposa						1				
Mendocino			1		17	8				4
Merced					45	17				
Modoc					5					
Mono					2					
Monterey				1	32	92	2			
Napa			1	1	84	50				1
Nevada			1		9	12				
Orange	1		1		31	26				4
Placer	2		6		69	10	1			
Plumas					6	1				12
Riverside					1	197				
Sacramento	1		6		182	1705	1			8
San Benito					14					
San Bernardino					91	495	2			
San Diego			1		35	836				1
San Francisco	197		9	11	538	8984	10	10	9	40
San Joaquin					5		2			
San Luis Obispo			3		65	103				1
San Mateo			4		30	53				1
Santa Barbara			2		67	237				
Santa Clara	1		7	1	60	688	3	4		
Santa Cruz			1		27	151	1			
Shasta			12		29					2
Sierra										
Siskiyou					6					1
Solano			3		30	617				9
Sonoma					8	441		1		
Stanislaus			1		9	51				
Sutter					1					
Tehama					11	138				7
Trinity					1					1
Tulare					91	195				
Tuolumne							1			
Ventura	1				5	15				
Yolo					11		1			1
Yuba			7		12	648				
Totals	452	4	88	31	3196	29565	56	24	539	115

TABLE III. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued.
(Tabulated by Counties.)

Counties.	Gambling	Hitching ordinance	Incorrigible	Indecent exposure	Juvenile laws	License	Liquor laws	Lottery	Malicious mischief	Misdemeanors not specified
Alameda	844	74		9		43	39	549	13	76
Alpine (no convictions.)										
Amador						2				3
Butte				4			7			
Calaveras										
Colusa							1			1
Contra Costa				9		1				
Del Norte										1
El Dorado	2								1	
Fresno	4			6		1	3			12
Glenn										
Humboldt				1					1	4
Imperial							5			19
Inyo				1			18		2	2
Kern										85
Kings										1
Lake							3			
Lassen							3			
Los Angeles	105	127		17		182	5	70	134	1228
Madera						2	4			2
Marin									1	
Mariposa							1			
Mendocino				3			2			3
Merced							1		1	
Modoc							5			10
Mono							6			
Monterey				2					3	1
Napa				1			4			
Nevada				1						
Orange				1			3		2	
Placer	2			3		4	1		3	8
Plumas										2
Riverside							2			9
Sacramento	11			7			1		2	15
San Benito										
San Bernardino				4			57			36
San Diego				2			1			1
San Francisco	129			38	2	15	55	89	58	203
San Joaquin				1						4
San Luis Obispo	2			5		1			4	3
San Mateo									3	8
Santa Barbara				2					5	98
Santa Clara	84			2		2	1	14	2	8
Santa Cruz										1
Shasta				4					1	1
Sierra							1			
Siskiyou										2
Solano	1								1	2
Sonoma						2	7			4
Stanislaus										2
Sutter										
Tehama									1	3
Trinity										
Tulare							4			24
Tuolumne										8
Ventura									1	9
Yolo				4					1	5
Yuba				3					5	
Totals	1184	201		130	2	255	240	722	245	1904

TABLE III. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909—Continued.
(Tabulated by Counties.)

Counties.	Nuisance	Obtaining money under false pretenses	Passing fictitious check	Petit larceny	Prostitution	Resisting an officer	Sleeping out	Threat to kill	Vagrancy	Vulgar language
Alameda	8			108		1	159		399	38
Alpine (no convictions.)										
Amador				5					2	
Butte		1		31					12	
Calaveras				2						
Colusa		2		5					1	
Contra Costa				17					73	
Del Norte										
El Dorado				3						
Fresno		4	1	46				1	294	1
Glenn				8					4	
Humboldt		1		7	1				21	
Imperial		1		7						
Inyo				4				2	4	
Kern				49					128	
Kings				20					61	
Lake		1								
Lassen				2						
Los Angeles		9		380					1352	
Madera				6		1			9	
Marin				2					12	
Mariposa				1						
Mendocino		1		5					10	
Merced				3					55	
Modoc				1						
Mono										
Monterey		1		13					92	
Napa				8					3	
Nevada				7					5	
Orange				6					112	
Placer				43		2			149	
Plumas			4	2					1	
Riverside				1					3	
Sacramento		1		174					179	
San Benito				4						
San Bernardino		2		89					224	
San Diego		2		33		1			56	
San Francisco	37	12		404	60	20		2	1135	
San Joaquin		1		36					121	
San Luis Obispo		1		14		2			38	
San Mateo				13					48	
Santa Barbara		1		30					61	
Santa Clara		1		71		1			244	
Santa Cruz		1		23					72	
Shasta		7		21					27	
Sierra										
Siskiyou		2		9					4	
Solano		3		26					65	
Sonoma		1		15					53	
Stanislaus				4					6	
Sutter										
Tehama		4		13					66	
Trinity		1								
Tulare				8					11	
Tuolumne		2		2				1		
Ventura				23					69	
Yolo				14					25	
Yuba				38					28	
Totals	45	63	5	1856	61	28	159	6	5334	39

TABLE IV. Length of Sentence for Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1909. (Tabulated by Counties.)

Counties.	Total number of misdemeanors	3 days and under	4 and 5 days	6 to 10 days	11 to 30 days	31 to 60 days	Over 60 days	Fined	Bail forfeited	Probation	Sentence suspended
Alameda	7503	4	15	31	68	73	131	1334	2647	1	3199
Alpine (no convictions.)											
Amador	28		2	5	10	6	5				
Butte	936		8	18	49	11	41	4			805
Calaveras	7				4	2	1				
Colusa	61			1	5	3	6	2			44
Contra Costa	317	35	79	43	66	13	32				49
Del Norte	3				2						1
El Dorado	27		12	3	7	1	4				
Fresno	771		222	216	219	51	63				
Glenn	22			7	2	4	7	2			
Humboldt	255			9	32	9	10	4			191
Imperial	42	3	2	4	16	3	6	8			
Inyo	58			1	13	13	17	12		2	
Kern	389		16	87	129	42	78				37
Kings	355		50	32	28	8	14				223
Lake	13		1	1	7	1	3				
Lassen	9			4	2		3				
Los Angeles	14498	15	88	696	475	70	75	1			13078
Madera	152		33	6	24	2	17	21		3	46
Marin	187	82	62	15	13	3	7	5			
Mariposa	4			1	1			2			
Mendocino	55		1	16	20	9	6	3			
Merced	129		4	18	61	18	26	1		1	
Modoc	23			5	4	3	8			3	
Mono	8				2	6					
Monterey	242		10	31	82	13	14				92
Napa	158		11	14	33	7	14	29			50
Nevada	46			2	7	4	22				11
Orange	195		3	63	74	4	19	7			25
Placer	314	1	28	91	124	19	40	11			
Plumas	30			1	5	4	14	6			
Riverside	216			1	7		11				197
Sacramento	2412		12	23	115	51	127	184		1	1899
San Benito	18			3	12		3				
San Bernardino	1136	1	27	229	201	56	148	3		1	470
San Diego	995	4	4	22	55	23	48	2		3	834
San Francisco	13620	330	44	227	474	116	451	3215	105		8658
San Joaquin	188	11	45	31	64	12	24				1
San Luis Obispo	244	1	14	43	64	10	9				103
San Mateo	166		15	32	33	10	24				52
Santa Barbara	506	2	22	52	108	25	19	40			238
Santa Clara	1442		1	30	107	21	67	281	158	2	775
Santa Cruz	278			8	91	16	13				150
Shasta	114			1	57	30	19	6			1
Sierra	1						1				
Siskiyou	29			3	13	6	7				
Solano	766		2	19	66	19	43				617
Sonoma	548	21	25	46	48	17	17				374
Stanislaus	75			1	18	4	5	9			38
Sutter	5							5			
Tehama	249		17	19	49	9	5	12			138
Trinity	5							3			2
Tulare	336		3	71	45	7	15				195
Tuolumne	14			1	4	1	8				
Ventura	141	1	18	16	64	9	22				11
Yolo	65			12	28	12	13				
Yuba	763			3	44	24	44				648
Totals	51169	511	896	2314	3351	880	1826	5212	2910	17	33252

TABLE V. Ages of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910. (Tabulated by Counties.)

Counties.	Total number of misdemeanors.	Sex.		Ages.						
		Total males.	Total females.	Under 15 years.	15 to 19 years.	20 to 29 years.	30 to 39 years.	40 to 49 years.	50 years and over.	Unknown.
Alameda	6782	6189	593	5	207	1742	1827	1623	1378	-----
Alpine (no convictions).										
Amador	23	23	-----	-----	-----	10	4	5	4	-----
Butte	604	602	2	-----	16	76	85	48	67	312
Calaveras	8	8	-----	-----	-----	-----	3	2	3	-----
Colusa	96	95	1	-----	-----	8	8	3	-----	77
Contra Costa	225	224	1	-----	11	72	57	57	28	-----
Del Norte	8	8	-----	-----	-----	2	2	3	1	-----
El Dorado	18	17	1	-----	-----	-----	-----	-----	-----	18
Fresno	717	709	8	-----	22	218	212	141	124	-----
Glenn	29	29	-----	-----	-----	9	5	3	4	8
Humboldt	237	235	2	-----	1	24	10	13	7	182
Imperial	28	28	-----	-----	2	18	4	4	-----	-----
Inyo	62	61	1	-----	-----	2	6	9	4	41
Kern	427	426	1	1	3	82	175	113	41	12
Kings	279	279	-----	-----	5	17	16	9	9	223
Lake	9	9	-----	-----	-----	1	2	3	3	-----
Lassen	8	8	-----	-----	-----	-----	3	1	1	3
Los Angeles	14772	14322	450	-----	154	559	301	137	125	13496
Madera	251	251	-----	-----	-----	62	63	43	32	51
Marin	247	244	3	-----	-----	-----	-----	-----	-----	247
Mariposa	1	1	-----	-----	-----	-----	-----	1	-----	-----
Mendocino	66	66	-----	-----	3	15	16	20	12	-----
Merced	118	118	-----	-----	7	39	36	22	14	-----
Modoc	17	17	-----	-----	-----	2	6	6	3	-----
Mono	5	5	-----	-----	-----	1	-----	2	2	-----
Monterey	279	279	-----	-----	6	56	33	19	9	156
Napa	219	219	-----	-----	-----	15	19	14	32	139
Nevada	42	42	-----	-----	2	15	12	6	7	-----
Orange	363	363	-----	-----	25	178	77	36	15	32
Placer	459	458	1	-----	12	139	103	61	42	102
Plumas	12	12	-----	-----	-----	2	3	1	6	-----
Riverside	331	330	1	-----	10	37	25	13	6	240
Sacramento	2368	2356	12	-----	15	134	110	58	75	1976
San Benito	28	27	1	-----	1	-----	-----	-----	-----	27
San Bernardino	1877	1855	22	-----	41	419	218	99	46	1054
San Diego	1738	1704	34	-----	33	204	206	154	101	1040
San Francisco	12411	11202	1209	-----	269	3444	3438	2708	2531	21
San Joaquin	183	179	4	-----	11	88	40	24	9	11
San Luis Obispo	206	205	1	-----	24	83	46	31	18	4
San Mateo	116	116	-----	-----	2	19	36	37	22	-----
Santa Barbara	591	589	2	-----	10	84	52	40	40	365
Santa Clara	1239	1210	29	-----	42	270	241	211	227	248
Santa Cruz	177	176	1	-----	5	30	28	25	18	71
Shasta	101	98	3	-----	2	39	31	21	8	-----
Sierra (no convictions).										
Siskiyou	49	47	2	-----	3	24	10	4	8	-----
Solano	770	767	3	-----	10	66	44	27	11	612
Sonoma	521	517	4	-----	1	15	42	39	45	379
Stanislaus	56	56	-----	-----	2	18	19	11	6	-----
Sutter	13	13	-----	-----	1	8	1	1	1	1
Tehama	176	176	-----	-----	2	7	-----	3	1	163
Trinity	2	2	-----	-----	-----	1	-----	-----	-----	1
Tulare	212	212	-----	-----	1	35	44	32	10	90
Tuolumne	16	15	1	-----	-----	10	1	3	1	1
Ventura	424	424	-----	-----	7	20	24	11	1	361
Yolo	188	188	-----	-----	4	29	30	20	9	96
Yuba	573	571	2	-----	4	34	29	16	11	479
Totals	50777	48382	2395	6	976	8482	7803	5993	5178	22339

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910. (Tabulated by Counties.)

Counties.	Total number of misdemeanors.	Agents.	Bakers.	Barbers.	Bartenders.	Blacksmiths.	Boiler makers.
Alameda	6782	128	43	32	32	38	32
Alpine (no convictions).							
Amador	23				1		
Butte	604			2		1	2
Calaveras	8						
Colusa	96				1		
Contra Costa	225			4		2	2
Del Norte	8						
El Dorado	18						
Fresno	717	1	1	5	1	10	5
Glenn	29		1				
Humboldt	237				1		
Imperial	28					1	
Inyo	62					2	
Kern	427				1		
Kings	279						
Lake	9						
Lassen	8						
Los Angeles	14772	1	4	3	1	7	7
Madera	251		1	1		1	
Marin	247						
Mariposa	1						
Mendocino	66			1	2		
Merced	118				1	1	
Modoc	17						
Mono	5						
Monterey	279		2	1		1	
Napa	219						
Nevada	42				1		
Orange	363		1	2	1		1
Placer	459	2		1	3	7	3
Plumas	12						
Riverside	331			1			
Sacramento	2368		7	3	2	2	4
San Benito	28					1	
San Bernardino	1877		6	7	1	3	2
San Diego	1738			2	1	4	
San Francisco	12411	82	81	79	104	106	55
San Joaquin	183			9	3	1	1
San Luis Obispo	206				1		1
San Mateo	116		1		2	3	
Santa Barbara	591			1	2	2	2
Santa Clara	1239	2	1	3	4	8	1
Santa Cruz	177		1	2		3	
Shasta	101	1			1		
Sierra (no convictions).							
Siskiyou	49		1	1			
Solano	770					1	
Sonoma	521			3			
Stanislaus	56					4	2
Sutter	13						
Tehama	176						
Trinity	2						
Tulare	212					1	
Tuolumne	16						
Ventura	424			1			
Yolo	188		1	1		4	
Yuba	573			1		5	2
Totals	50777	217	152	166	167	219	122

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Bookkeepers.	Bricklayers.	Butchers.	Carpenters.	Cement workers.	Chauffeurs.	Cigar makers.	Clerks.	Conductors.
Alameda	45	29	52	219	18	62	42	242	9
Alpine (no convictions).									
Amador									
Butte	1		2	4			1	1	
Calaveras									
Colusa				1					
Contra Costa	3	1	1	8					2
Del Norte									
El Dorado				1					
Fresno	2	2	2	8	1	2	1	3	
Glenn									
Humboldt		1						2	
Imperial						1			
Inyo				1					
Kern									
Kings									
Lake									
Lassen									
Los Angeles	1	2	5	24	6	1	1	12	
Madera			2	3				1	
Marin									
Mariposa									
Mendocino				1					
Merced			1						
Modoc									
Mono									
Monterey				3					
Napa	1	1		2					
Nevada								1	
Orange	1		2	9			2		
Placer		1	2	6		1	1	1	
Plumas				3					
Riverside		1							
Sacramento	2	1	3	8				7	
San Benito									
San Bernardino	1	4	5	8	1	2	2	4	
San Diego	1	1		9				2	
San Francisco	50	30	81	366	51	124	21	384	17
San Joaquin		1	2	4				2	1
San Luis Obispo		1	2	4					
San Mateo			2	4	1			5	
Santa Barbara	2	1	1	1				1	
Santa Clara	2	3	2	9	2	9	3	7	
Santa Cruz			1	8				1	
Shasta									
Sierra (no convictions).									
Siskiyou									
Solano		1		2	1	1		3	
Sonoma		1	4	1				1	
Stanislaus			1						
Sutter									
Tehama									
Trinity									
Tulare		1							
Tuolumne				1					
Ventura									
Yolo			1	1	1			1	
Yuba	1								
Totals	113	83	174	719	82	203	74	681	29

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Contractors	Cooks	Domestics	Electricians	Engineers	Expressmen	Farmers	Firemen	Gamblers
Alameda	27	639	214	33	60	22	32	38	24
Alpine (no convictions).									
Amador									
Butte		9		1			1		
Calaveras							1		
Colusa			1						
Contra Costa		15	1	1	4		5	2	
Del Norte									
El Dorado			1				3		
Fresno		20		2	7		8	3	
Glenn							2		
Humboldt					1		1		
Imperial		1							
Inyo		1					2		
Kern									
Kings									
Lake									
Lassen									
Los Angeles		47		4	2		20	11	
Madera		5					2		1
Marin									
Mariposa									
Mendocino		1	2		1			1	
Merced		7					1	3	
Modoc					1				
Mono									
Monterey		4	1		2		1	1	
Napa					1		9	1	
Nevada		2					1		
Orange		8		4	5		2	1	
Placer		18			5		3	3	
Plumas		1							
Riverside		1			3		2		
Sacramento		21	2	3	5		2	3	
San Benito			1						
San Bernardino		23		3	1		4	2	
San Diego		12		3	1	1	11	1	
San Francisco	49	395	315	87	107	19	39	204	
San Joaquin		6	4				1	2	
San Luis Obispo		2			1			3	1
San Mateo		2		1	2		3	1	
Santa Barbara		9	2	2	2		4		
Santa Clara	1	9		2	1	1	1	1	
Santa Cruz		11		1			3	1	
Shasta		1			1		2		1
Sierra (no convictions).									
Siskiyou							3		
Solano		6		2				2	
Sonoma		3	2				13		
Stanislaus		3							
Sutter							1		
Tehama									
Trinity									
Tulare							16		
Tuolumne		1						1	
Ventura									
Yolo		4				1	2	1	
Yuba		5		1				2	
Totals	77	1292	546	150	213	44	201	288	26

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Gardeners	Hodcarriers	Hostlers	Housewives	Iron workers	Janitors	Laborers	Laundry workers	Machinists
Alameda	158	19	46	96	33	12	1520	168	110
Alpine (no convictions).									
Amador							8		
Butte	2		2	1	1		177		5
Calaveras							3		
Colusa							15		
Contra Costa	1				1		90	1	3
Del Norte							7		
El Dorado							6		
Fresno		2	3		3		467		14
Glenn							23		
Humboldt	1						21	1	
Imperial							25		
Inyo	1						43		
Kern							380		
Kings							55		
Lake							8		
Lassen							7		
Los Angeles	2		1	5	5	1	736		19
Madera	1		1				148		1
Marin									
Mariposa							1		
Mendocino		1	1	1			27	1	1
Merced	2	1			1		71	1	
Modoc							15		
Mono							5		
Monterey			3		2		54		2
Napa	2		1				29	1	2
Nevada							17		
Orange			1				225	1	4
Placer					2	1	295		10
Plumas					1		4		
Riverside							65		1
Sacramento		1	3	2	2		151		12
San Benito							24		
San Bernardino	2			2	1		571	1	7
San Diego	1	1					497	2	6
San Francisco	34	39	77	492	140	27	2719	73	187
San Joaquin							105		2
San Luis Obispo							158		
San Mateo	4			1			46	1	
Santa Barbara	2				2		113	1	5
Santa Clara	6	1	2	2	1		701		5
Santa Cruz	2		2	1			47	1	
Shasta							64		
Sierra (no convictions).									
Siskiyou	1								2
Solano	1		2		2		76	2	3
Sonoma				2			81		
Stanislaus			1		2		26		1
Sutter							10		
Tehama							175		
Trinity							2		
Tulare							123		
Tuolumne							8		
Ventura							62		
Yolo	1				2		36		1
Yuba	1		2				37		1
Totals	225	65	148	605	201	41	10379	255	404

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Merchants.	Milkmen.	Millhands.	Miners.	Molders.	Motormen.	No occupation.	Painters.	Peddlers.
Alameda	219	10	22	61	14	4	438	140	114
Alpine (no convictions).									
Amador				12			1		
Butte			6	19			1	6	
Calaveras				1					
Colusa							1		
Contra Costa				20	1			9	1
Del Norte									
El Dorado				6					
Fresno	2		2	25	8		4	14	
Glenn								1	
Humboldt			1	1			4	3	
Imperial									
Inyo				8					
Kern							2	1	
Kings							1		
Lake							1		
Lassen									1
Los Angeles	5		2	61	6		7	29	4
Madera		2	1	2			1	5	
Marin									
Mariposa									
Mendocino	1			3	1		2	2	
Merced				7	1			3	1
Modoc									
Mono									
Monterey				3	4		1	2	1
Napa	1			1	2				
Nevada			3	4			1	1	
Orange				9	4			5	
Placer			2	25	2		7	10	2
Plumas	1								
Riverside	4			3			57		
Sacramento			2	19	4		8	7	3
San Benito							2		
San Bernardino			1	41	7		15	7	1
San Diego	8		1	7	1		33	16	3
San Francisco	179	37	71	155	53	20	424	259	202
San Joaquin				1	1		5	1	
San Luis Obispo				1			1	10	
San Mateo		2		3	1	1	1		1
Santa Barbara				11	2		2	7	2
Santa Clara	4			3	1		35	10	10
Santa Cruz			1	4			4	1	
Shasta				24			3	1	
Sierra (no convictions).									
Siskiyou				1			33	3	
Solano			1	7			1	7	1
Sonoma					1		5	1	1
Stanislaus					1				2
Sutter									
Tehama									
Trinity									
Tulare	1								
Tuolumne				1			1		
Ventura									
Yolo				5	2			3	
Yuba	1		2	4	1		2	4	1
Totals	426	51	118	558	118	25	1104	568	351

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Plasterers	Plumbers	Porters	Printers	Restaurant keepers	Sailors	Salesmen	Saloon keepers	Shoemakers
Alameda	39	57	36	29	6	172	85	6	35
Alpine (no convictions).									
Amador									
Butte		1	1	2		2			2
Calaveras									
Colusa									
Contra Costa	1	5	2	2		4			1
Del Norte		1							
El Dorado									
Fresno	4	5				4	1	1	2
Glenn			1						
Humboldt		1	1			4			
Imperial									
Inyo								1	
Kern									
Kings									
Lake									
Lassen									
Los Angeles		9	2	8	4	31	4		7
Madera		1	2	1					1
Marin						2			
Mariposa									
Mendocino						2			1
Merced				1		1			1
Modoc									
Mono									
Monterey		2		1		3			
Napa	2	1				4			
Nevada						2			
Orange		1				5	3		
Placer	1		1						3
Plumas									
Riverside									
Sacramento	1	1	1	1		10			3
San Benito									
San Bernardino		8	2	6		5		1	1
San Diego		1		2	1	15	2		1
San Francisco	62	109	76	131	82	882	110	26	71
San Joaquin				2		3			
San Luis Obispo				1					1
San Mateo		2		2		2		1	
Santa Barbara				4		4	1		
Santa Clara		3		6	2	6			3
Santa Cruz		1		1		2	2		
Shasta									
Sierra (no convictions).									
Siskiyou									
Solano			2	1		19			
Sonoma		1				2	1		
Stanislaus	1								
Sutter									
Tehama									1
Trinity									
Tulare	2								
Tuolumne									
Ventura									
Yolo		1				2			1
Yuba	1			1		2	1		2
Totals	114	211	127	202	95	1190	210	36	137

TABLE VI. Occupations of Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Soldiers.	Stevedores.	Stonecutters.	Tailors.	Teamsters.	Tinners.	Unclassified.	Unknown.	Waiters.
Alameda	10	43	3	68	246	7	567	1	76
Alpine (no convictions).									
Amador				1					
Butte				3	10		14	318	6
Calaveras					1		2		
Colusa								77	
Contra Costa		2			9		16	2	3
Del Norte									
El Dorado								1	
Fresno			2	2	13		42	4	9
Glenn							1		
Humboldt	1				3		8	180	1
Imperial									
Inyo					1		1	1	
Kern							4	39	
Kings								223	
Lake									
Lassen									
Los Angeles	20	1	2	3	47	1	78	13489	24
Madera				1	7	1	7	51	
Marin								245	
Mariposa									
Mendocino					2		11		
Merced					6		5		2
Modoc							1		
Mono									
Monterey	5		1	1	8	1	10	156	3
Napa	9			1	4		5	139	
Nevada					2		3		4
Orange			1	1	14		17	32	1
Placer	1				21	1	14	2	2
Plumas							2		
Riverside				1			1	191	
Sacramento			1	5	24		31	1992	9
San Benito									
San Bernardino			1	4	12	1	34	1054	13
San Diego	9	1		3	6		23	1041	8
San Francisco	334	153	61	144	581	24	1126	21	384
San Joaquin				2	4	1	3	13	3
San Luis Obispo			1	5		3	8	2	
San Mateo			1		7		11		2
Santa Barbara				1	4	4	14	379	1
Santa Clara				5	21	2	30	302	6
Santa Cruz			1		2		14	56	3
Shasta					1				1
Sierra (no convictions).									
Siskiyou				2	1		1		
Solano			1	2	3		7	612	1
Sonoma		2		1	2		12	380	1
Stanislaus					10		2		
Sutter							1	1	
Tehama									
Trinity									
Tulare							2	66	
Tuolumne							1	1	1
Ventura								361	
Yolo				2	8		10	94	2
Yuba			1	2	5	1	1	479	4
Totals	389	202	77	260	1085	47	2140	22005	570

TABLE VII. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910. (Tabulated by Counties.)

Counties.	Total number of misdemeanors.	Assault.	Auto laws.	Battery.	Beating the railroad.	Begging.	Bicycle ordinance.	City and county ordinances not specified.	Concealed weapons.	Contempt of court.
Alameda	6782	14	149	98	17	6	80	285	41	2
Alpine (no convictions).										
Amador	23	2		2						
Butte	604	4		6	10					
Calaveras	8	1		1						
Colusa	96			1						
Contra Costa	225	2		7	28				3	
Del Norte	8	1								
El Dorado	18	2		2						
Fresno	717	8		7		21		1	10	
Glenn	29			1						
Humboldt	237	3		1		1				
Imperial	28	3		2				1	4	
Inyo	62	1		2						2
Kern	427	6		1						
Kings	279			3						
Lake	9	2								
Lassen	8	1								
Los Angeles	14772	12	740	238	54	93	67	918	96	9
Madera	251	1		3		2				
Marin	247			3					1	
Mariposa	1									
Mendocino	66									
Merced	118	1		2						1
Modoc	17			1						3
Mono	5									
Monterey	279			4	18					
Napa	219			5						
Nevada	42			3	4				2	
Orange	363	2		1				2		
Placer	459	6		8	25	1			1	
Plumas	12	1		1						
Riverside	331	8								
Sacramento	2368	6		18	7	2				2
San Benito	28	1								
San Bernardino	1877	12		23	225	2			7	
San Diego	1738	2	57	43	1			173		1
San Francisco	12411	16	9	159	3	205		533	104	4
San Joaquin	183	2		16	11				1	
San Luis Obispo	206	2		7	1					
San Mateo	116	2		4						2
Santa Barbara	591	2		3	5	1				
Santa Clara	1239		22	25		15	113	3	6	
Santa Cruz	177			1						
Shasta	101	3		3						
Sierra (no convictions).										
Siskiyou	49			3	1					1
Solano	770	2		12						
Sonoma	521	2		6						
Stanislaus	56									
Sutter	13			1						
Tehama	176	1								
Trinity	2									
Tulare	212			2						
Tuolumne	16									
Ventura	424	5		1				1		
Yolo	188			3	3					
Yuba	573	1		6						5
Totals	50777	140	977	739	413	349	260	1917	276	32

TABLE VII. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued.

(Tabulated by Counties.)

Counties.	Cruelty to animals	Defaulting witness	Defrauding an innkeeper	Discharging firearms	Disturbing the peace	Drunk	Embezzlement	Failure to provide	Fast driving	Fish and game laws
Alameda	40	1	3	4	141	3616	14		2	27
Alpine (no convictions).										
Amador			4		8					
Butte			3		101	311	5			2
Calaveras					3	1				
Colusa			1		3	77				
Contra Costa			8		66	11		1		
Del Norte										1
El Dorado					10					
Fresno	2		5		147	238	4	1		
Glenn					5	3		1		
Humboldt			2		18	180				
Imperial					2					
Inyo			1		21					
Kern					183					
Kings					22	225				
Lake					4	2				
Lassen						2		1		
Los Angeles	387		5	3	714	7800	26			2
Madera					132	51			2	
Marin					109	108				1
Mariposa					1					
Mendocino					21	13				
Merced					63					
Modoc					4		1			
Mono										
Monterey					24	155				
Napa					59	140	1			2
Nevada			1		9					
Orange			2		24	34	2			4
Placer	2		2		205	54				
Plumas					2					
Riverside	1	1			4	191				
Sacramento	3		7		52	1984	3			1
San Benito					23					
San Bernardino	1				127	1072				1
San Diego	7				108	1027		1		
San Francisco	144		1	11	452	9295	7	5	10	44
San Joaquin			1		28		2			1
San Luis Obispo					70		1			
San Mateo					23	45	1			1
Santa Barbara					86	365	3			
Santa Clara			1	1	44	638	3		2	3
Santa Cruz					14	56		1		
Shasta	1		6		25					
Sierra (no convictions).										
Siskiyou			3		6	1				
Solano					29	613	1			2
Sonoma			2		20	386				1
Stanislaus					13	7				
Sutter					1			1		8
Tehama					26	1				
Trinity			1							
Tulare	1				17	155				
Tuolumne										
Ventura	1		1		13	362				
Yolo					13	94				
Yuba			2		20	479				
Totals	590	2	62	19	3315	29792	74	12	16	101

TABLE VII. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued.

(Tabulated by Counties.)

Counties.	Gambling	Hitching ordinance	Incorrigible	Indecent exposure	Juvenile laws	License	Liquor laws	Lottery	Malicious mischief	Misdemeanors not specified
Alameda	920	15	------	10	------	32	46	605	17	75
Alpine (no convictions).										
Amador	------	------	------	------	------	------	------	------	------	3
Butte	------	------	------	1	------	------	2	------	2	2
Calaveras	------	------	------	------	------	------	------	------	------	1
Colusa	------	------	------	------	------	------	1	------	------	3
Contra Costa	4	------	------	2	------	------	------	------	3	1
Del Norte	------	------	------	------	------	------	1	------	------	------
El Dorado	------	------	------	------	------	------	------	------	------	2
Fresno	------	------	------	8	------	1	8	------	1	23
Glenn	------	------	------	------	------	------	1	------	------	6
Humboldt	------	------	------	1	------	------	1	------	------	2
Imperial	------	------	------	------	------	------	1	------	------	2
Inyo	------	------	------	1	------	------	24	------	------	------
Kern	------	------	------	------	------	------	------	------	------	60
Kings	------	------	------	------	------	------	------	------	------	1
Lake	------	------	------	------	------	------	1	------	------	------
Lassen	------	------	------	------	------	------	4	------	------	------
Los Angeles	195	112	------	16	------	406	45	122	43	1222
Madera	------	------	------	------	------	------	------	------	------	1
Marin	------	------	------	------	------	2	------	------	------	2
Mariposa	------	------	------	------	------	------	------	------	------	------
Mendocino	------	------	------	2	------	------	15	------	------	5
Merced	------	------	------	1	------	------	------	------	1	2
Modoc	------	------	------	------	------	------	2	------	------	2
Mono	------	------	------	------	------	------	2	------	------	------
Monterey	------	------	------	2	------	------	------	------	4	5
Napa	------	------	------	------	------	------	------	------	------	------
Nevada	3	------	------	1	------	------	1	------	1	------
Orange	------	------	------	3	------	------	1	------	4	9
Placer	------	------	------	5	------	3	------	------	6	3
Plumas	------	------	------	------	------	------	7	------	------	------
Riverside	------	------	------	1	------	1	7	------	------	4
Sacramento	1	------	------	5	3	------	2	------	6	14
San Benito	------	------	1	------	------	------	------	------	------	2
San Bernardino	1	------	------	2	------	------	88	------	1	33
San Diego	7	------	------	4	------	------	6	24	5	8
San Francisco	26	12	------	24	------	22	51	48	39	79
San Joaquin	------	------	------	3	------	------	------	------	6	15
San Luis Obispo	------	------	------	1	------	------	------	------	------	43
San Mateo	------	------	------	------	------	------	1	------	1	1
Santa Barbara	------	------	------	2	------	------	------	------	------	33
Santa Clara	------	------	------	5	------	5	2	3	4	29
Santa Cruz	------	------	------	------	------	------	------	------	1	1
Shasta	------	------	------	1	------	------	2	------	3	------
Sierra (no convictions)										
Siskiyou	------	------	------	------	------	------	2	------	------	7
Solano	------	------	------	1	------	------	------	------	2	1
Sonoma	------	------	------	------	------	1	23	------	3	------
Stanislaus	------	------	------	4	------	------	------	------	------	2
Sutter	------	------	------	------	------	------	------	------	------	------
Tehama	------	------	------	------	------	------	------	------	1	58
Trinity	------	------	------	------	------	------	------	------	------	------
Tulare	------	------	------	------	------	------	3	------	------	15
Tuolumne	------	------	------	------	------	------	------	------	------	11
Ventura	1	------	------	------	------	------	3	------	------	11
Yolo	------	------	------	1	------	------	------	------	------	3
Yuba	------	------	------	2	------	------	------	------	3	8
Totals	1158	139	1	109	3	473	353	802	157	1810

TABLE VII. Nature of Offense Committed by Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910—Continued.

(Tabulated by Counties.)

Counties.	Nuisance	Obtaining money under false pretenses	Passing fictitious check	Petit larceny	Prostitution	Resisting an officer	Sleeping out	Threat to kill	Vagrancy	Vulgar language
Alameda	10	2	------	112	------	------	53	------	323	22
Alpine (no convictions).										
Amador	------	1	------	1	------	------	------	------	2	------
Butte	------	1	------	24	------	1	------	------	129	------
Calaveras	------	------	------	1	------	------	------	------	------	------
Colusa	------	------	------	9	------	------	------	------	1	------
Contra Costa	------	------	------	22	------	------	------	------	67	------
Del Norte	------	------	------	5	------	------	------	------	------	------
El Dorado	------	------	------	------	------	------	------	------	2	------
Fresno	------	2	------	43	------	2	------	------	185	------
Glenn	------	------	------	7	------	1	------	------	4	------
Humboldt	------	1	------	11	------	------	------	------	16	------
Imperial	------	------	------	4	------	------	------	------	9	------
Inyo	------	------	------	5	------	------	------	------	5	------
Kern	------	------	------	53	------	------	------	------	124	------
Kings	------	------	------	13	------	------	------	------	15	------
Lake	------	------	------	------	------	------	------	------	------	------
Lassen	------	------	------	------	------	------	------	------	------	------
Los Angeles	------	6	------	283	8	1	------	1	1148	------
Madera	------	------	------	8	------	1	------	------	50	------
Marin	------	------	------	3	------	------	------	------	18	------
Mariposa	------	------	------	------	------	------	------	------	------	------
Mendocino	------	------	------	5	------	------	------	------	5	------
Merced	------	1	------	13	------	------	------	------	33	------
Modoc	------	------	------	4	------	------	------	------	------	------
Mono	------	------	------	2	------	------	------	------	1	------
Monterey	------	1	------	10	------	1	------	------	55	------
Napa	------	------	------	8	------	------	------	------	4	------
Nevada	------	1	------	15	------	------	------	------	1	------
Orange	------	------	------	22	------	------	------	------	253	------
Placer	------	1	------	54	------	3	------	------	80	------
Plumas	------	------	------	1	------	------	------	------	------	------
Riverside	------	------	------	14	------	------	------	------	99	------
Sacramento	------	1	------	124	------	------	------	2	125	------
San Benito	------	------	------	1	------	------	------	------	------	------
San Bernardino	------	1	------	109	------	------	------	------	172	------
San Diego	------	1	1	54	------	------	------	2	206	------
San Francisco	10	6	------	263	25	20	------	6	774	4
San Joaquin	------	1	2	72	------	------	------	------	22	------
San Luis Obispo	------	------	------	9	------	------	------	------	72	------
San Mateo	------	------	------	6	------	------	------	------	29	------
Santa Barbara	------	3	------	16	------	------	------	------	72	------
Santa Clara	1	3	------	73	------	------	------	------	238	------
Santa Cruz	------	1	------	13	------	------	------	------	89	------
Shasta	------	------	------	27	------	------	------	------	30	------
Sierra (no convictions).										
Siskiyou	------	1	------	20	------	------	------	------	4	------
Solano	------	------	------	23	------	1	------	------	83	------
Sonoma	------	------	------	22	------	------	------	------	55	------
Stanislaus	------	------	------	12	------	------	------	------	18	------
Sutter	------	------	------	2	------	------	------	------	------	------
Tehama	------	------	------	25	------	------	------	------	64	------
Trinity	------	------	------	1	------	------	------	------	------	------
Tulare	------	------	------	4	------	------	------	------	15	------
Tuolumne	------	------	------	5	------	------	------	------	------	------
Ventura	------	1	------	9	------	------	------	------	15	------
Yolo	------	------	------	6	------	------	------	------	65	------
Yuba	------	------	------	21	------	------	------	------	26	------
Totals	21	36	3	1669	33	31	53	11	4803	26

TABLE VIII. Length of Sentence for Persons Convicted of Misdemeanors in California during the Fiscal Year ending June 30, 1910. (Tabulated by Counties.)

Counties.	Total number of misdemeanors.	3 days and under.	4 and 5 days.	6 to 10 days.	11 to 30 days.	31 to 60 days.	Over 60 days.	Fined.	Bail forfeited.	Probation.	Sentence suspended.
Alameda	6782	6	3	25	89	70	151	1029	2407	1	3001
Alpine (no convictions).											
Amador	23			5	11	2	5				
Butte	604		41	35	140	16	34	26		1	311
Calaveras	8				1		6	1			
Colusa	96			1	6	5	5	2			77
Contra Costa	225		39	47	81	31	27				
Del Norte	8			1	5	1		1			
El Dorado	18		4	5	3	4	2				
Fresno	717		238	207	171	34	67				
Glenn	29			4	8	1	12	3		1	
Humboldt	237		1	8	38	5	3	2			180
Imperial	28	1		5	7	5	4	6			
Inyo	62		2	5	11	11	33				
Kern	427		45	126	126	46	84				
Kings	279		7	10	23	6	10				223
Lake	9			2			3	4			
Lassen	8			1		1	2	2		1	1
Los Angeles	14772	4	92	736	349	55	48				3488
Madera	251	6	110	18	23	6	15	22			51
Marin	247	70	35	11	9		9	5			108
Mariposa	1				1						
Mendocino	66		2	4	9	7	6	38			
Merced	118	1	2	16	45	25	29				
Modoc	17				2	1	5	9			
Mono	5			1		2	2				
Monterey	279			19	77	11	16			1	155
Napa	219	1	1	5	15	4	10	44			139
Nevada	42			1	4	4	19	14			
Orange	363	5	10	187	72	3	22	32			32
Placer	459	1	94	116	171	46	30	1			
Plumas	12				2	1	2	7			
Riverside	331		4	7	48	16	16				240
Sacramento	2368	3	9	25	105	109	122	19		2	1974
San Benito	28		6	8	9	2	1	1		1	
San Bernardino	1877	1	60	146	396	102	118				1054
San Diego	1738	322	102	73	53	15	44	468	393	7	261
San Francisco	12411	264	40	403	529	113	425	1765	157		8715
San Joaquin	183				1		6	176			
San Luis Obispo	206		26	65	92	8	14	1			
San Mateo	116	3	13	12	9	18	10				51
Santa Barbara	591		6	25	104	16	27	48			365
Santa Clara	1239	1	2	72	89	28	86	197	104		660
Santa Cruz	177		1	6	86	11	16	1			56
Shasta	101			2	48	30	19	1			1
Sierra (no convictions).											
Siskiyou	49	1		1	14	15	12	6			
Solano	770		4	10	87	22	29	6			612
Sonoma	521	19	25	42	65	26	23	2			319
Stanislaus	56			15	23	9	9				
Sutter	13					1		11		1	
Tehama	176		21	52	59	20	7	17			
Trinity	2				1			1			
Tulare	212		9	81	36	10	10				66
Tuolumne	16			2	8	3	3				
Ventura	424	2	2	14	24	5	16				361
Yolo	188			5	67	15	7				94
Yuba	573			1	33	17	43				479
Totals	50777	711	1056	2668	3485	1014	1724	3968	3061	16	33074

CHART VI.

Arrests for Drunkenness in San Francisco and Los Angeles, Fiscal Years 1906-07 to 1909-10.

In this chart are represented the arrests for drunkenness in the cities of San Francisco and Los Angeles, during each month of the four fiscal years ending June 30, 1910. As the winter months approach and work in the interior of the State is suspended, a large portion of the laborers migrate to the two principal cities. It will be noticed that during this period the number of arrests increases, reaching its maximum during the month of December.

CHART VI.

Number of arrests.
Fiscal Year 1906-07.
Fiscal Year 1907-08.
Fiscal Year 1908-09.
Fiscal Year 1909-10.
1100
900
700
500
300
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
March
April
May
June
San Francisco.
Los Angeles.

TABLE I. Ages of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909. (Tabulated by Counties.)

Counties.	Totals.	Age.							Sex.	
		Under 15 years.	15 to 19 years.	20 to 29 years.	30 to 39 years.	40 to 49 years.	50 years and over.	Unknown.	Total males.	Total females.
Alameda	66		3	30	21	9	3		66	
Alpine (no convictions).										
Amador	11			7	1	2	1		11	
Butte	13		3	4	2	3	1		13	
Calaveras	2			1	1				2	
Colusa	7			4	3				7	
Contra Costa	15			7	5	1	2		15	
Del Norte	5		2	2			1		5	
El Dorado	2				1	1			2	
Fresno	37		4	23	4	5	1		37	
Glenn	1			1					1	
Humboldt	4			2	2				4	
Imperial	9		2	5	1		1		9	
Inyo	5		1	3	1				5	
Kern	41		4	13	14	6	4		41	
Kings	9			5	2	2			9	
Lake (no convictions).										
Lassen	1				1				1	
Los Angeles	167		18	93	33	17	6		164	3
Madera	5			2	1	1	1		5	
Marin	10		1	3	6				10	
Mariposa	1			1					1	
Mendocino	7			3	3		1		7	
Merced	12		2	4	3	1	2		12	
Modoc	2			1		1			2	
Mono (no convictions).										
Monterey	14		1	8	2	2	1		14	
Napa	4			2		2			4	
Nevada	1			1					1	
Orange	13		1	7	4		1		13	
Placer	26		3	12	8	3			26	
Plumas	4			4					4	
Riverside	9			4	2	3			9	
Sacramento	59		3	30	13	8	5		58	1
San Benito	3			1	2				3	
San Bernardino	24		2	12	7	1	2		24	
San Diego	29		3	14	4	7	1		29	
San Francisco	157		10	75	44	17	10	1	155	2
San Joaquin	41		4	22	12	2	1		41	
San Luis Obispo	10			6	2	1	1		10	
San Mateo	5			2	1	1	1		5	
Santa Barbara	10			5	3		2		10	
Santa Clara	26			11	5	6	4		26	
Santa Cruz	11		1	6	3		1		11	
Shasta	17			8	5	3	1		17	
Sierra (no convictions).										
Siskiyou	7		2	1	3	1			7	
Solano	18			12	3	3			18	
Sonoma	22			6	6	5	5		22	
Stanislaus	8			4	3	1			8	
Sutter	3			1		2			3	
Tehama	6		1	4	1				6	
Trinity (no convictions).										
Tulare	20		1	7	6	6			20	
Tuolumne	4		1	3					4	
Ventura	14			6	5	3			14	
Yolo	6			3	2		1		6	
Yuba	14			6	4	3	1		14	
Totals	1017		73	497	255	129	62	1	1011	6

TABLE II. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909. (Tabulated by Counties.)

Counties.	Totals.	Actors.	Bakers.	Blacksmiths.	Barbers.	Boiler makers.	Bookkeepers.	Brakemen.
Alameda	66	1		2	1		1	
Alpine (no convictions).								
Amador	11							
Butte	13							
Calaveras	2							
Colusa	7							
Contra Costa	15				1			
Del Norte	5							
El Dorado	2							
Fresno	37		1		1	1		
Glenn	1							
Humboldt	4			1				
Imperial	9							
Inyo	5							
Kern	41		1	1				
Kings	9				1			
Lake (no convictions).								
Lassen	1							
Los Angeles	167	1	3	1	8	1	4	
Madera	5							
Marin	10	1				1		
Mariposa	1							
Mendocino	7			1	1			
Merced	12			1				
Modoc	2							
Mono (no convictions).								
Monterey	14	1						
Napa	4							
Nevada	1							
Orange	13		1					
Placer	26		2	1	1			
Plumas	4				1			
Riverside	9							
Sacramento	59		1	1	1		2	
San Benito	3							
San Bernardino	24						1	
San Diego	29				1		1	
San Francisco	157		1	3	2		7	
San Joaquin	41	1	1	2	1		1	
San Luis Obispo	10		1					
San Mateo	5				1			
Santa Barbara	10		2				1	
Santa Clara	26		1		1			
Santa Cruz	11				1			
Shasta	17					1	2	
Sierra (no convictions).								
Siskiyou	7							
Solano	18					1		
Sonoma	22			1				
Stanislaus	8				2			
Sutter	3							
Tehama	6			1				
Trinity (no convictions).								
Tulare	20			1				
Tuolumne	4							
Ventura	14							
Yolo	6							
Yuba	14							
Totals	1017	5	15	17	25	5	20	

TABLE II. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Bricklayers.	Butchers.	Carpenters.	Chauffeurs.	Cigar makers.	Clerks.	Cooks.	Doctors.	Electricians.
Alameda	------	1	3	------	1	4	7	1	3
Alpine (no convictions).									
Amador	------	------	1	------	------	------	------	------	------
Butte	1	1	2	------	------	------	1	------	------
Calaveras	------	------	------	------	------	------	------	------	------
Colusa	------	------	2	------	------	------	------	------	------
Contra Costa	------	------	------	------	------	------	------	------	------
Del Norte	------	------	------	------	------	------	------	------	------
El Dorado	------	------	------	------	------	------	------	------	------
Fresno	------	1	3	------	------	2	2	------	1
Glenn	------	------	------	------	------	------	------	------	------
Humboldt	------	1	1	------	------	------	1	------	------
Imperial	------	------	------	------	------	------	1	------	------
Inyo	------	------	------	------	------	------	------	------	------
Kern	------	------	2	------	------	------	3	------	3
Kings	------	------	------	------	------	------	------	------	------
Lake (no convictions).									
Lassen	------	------	------	------	------	------	------	------	------
Los Angeles	------	2	4	2	1	6	15	2	5
Madera	------	------	------	------	------	1	------	------	------
Marin	------	------	------	------	------	------	1	------	1
Mariposa	------	------	------	------	------	1	------	------	------
Mendocino	------	------	------	------	------	------	1	------	------
Merced	1	------	1	------	------	------	------	------	------
Modoc	------	------	------	------	------	------	------	------	------
Mono (no convictions).									
Monterey	------	------	1	------	------	1	------	------	------
Napa	------	------	------	------	------	1	------	------	------
Nevada	------	------	------	------	------	------	------	------	------
Orange	------	------	------	------	------	------	------	------	------
Placer	------	------	1	------	------	------	4	------	------
Plumas	------	------	------	------	------	------	1	------	------
Riverside	------	------	------	------	------	------	------	------	------
Sacramento	------	------	6	1	------	2	7	------	------
San Benito	------	1	------	------	------	------	------	------	------
San Bernardino	------	1	4	------	------	------	------	------	------
San Diego	------	1	1	------	------	------	2	------	1
San Francisco	1	1	6	------	1	3	10	1	1
San Joaquin	------	------	------	------	------	2	3	------	------
San Luis Obispo	------	------	------	------	------	------	------	------	------
San Mateo	------	1	------	------	------	------	------	------	------
Santa Barbara	------	------	1	------	------	------	1	------	------
Santa Clara	------	1	2	1	------	1	2	1	1
Santa Cruz	------	------	------	------	------	------	1	------	------
Shasta	------	------	------	------	------	1	1	------	------
Sierra (no convictions).									
Siskiyou	------	------	------	------	------	------	------	------	------
Solano	------	------	------	------	------	1	3	------	------
Sonoma	------	------	2	------	------	------	2	------	------
Stanislaus	------	------	------	------	------	------	------	------	------
Sutter	------	------	------	------	------	------	------	------	------
Tehama	------	------	------	------	------	------	------	------	------
Trinity (no convictions).									
Tulare	------	1	2	------	------	------	1	------	------
Tuolumne	------	------	------	------	------	------	1	------	------
Ventura	------	------	------	------	------	------	1	------	------
Yolo	------	------	------	------	------	------	------	------	------
Yuba	------	------	1	------	------	------	2	1	1
Totals	3	13	46	4	3	26	74	6	17

TABLE II. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Engineers.	Farmers.	Firemen.	Fishermen.	Gardeners.	Hostlers.	Housewives.	Iron workers.	Laborers.
Alameda	2	3	2			2			13
Alpine (no convictions).									
Amador					1	1		1	2
Butte									3
Calaveras									
Colusa		1							3
Contra Costa				1					5
Del Norte		2							2
El Dorado									2
Fresno		3	1						12
Glenn									
Humboldt									
Imperial									6
Inyo									
Kern	1	1						1	10
Kings						2			2
Lake (no convictions).									
Lassen									
Los Angeles	1	3	3		3		2		35
Madera					1				1
Marin									2
Mariposa									
Mendocino									3
Merced	2								4
Modoc		1							1
Mono (no convictions).									
Monterey		2	1						4
Napa									2
Nevada									
Orange									6
Placer		1	1						7
Plumas									2
Riverside									7
Sacramento		2	2			1	1	2	9
San Benito									1
San Bernardino		1							6
San Diego	1								5
San Francisco	4	1	1	1		1	2		23
San Joaquin	2		2						12
San Luis Obispo									3
San Mateo									1
Santa Barbara	1								1
Santa Clara		1	1			1			2
Santa Cruz			1						4
Shasta	1	1							2
Sierra (no convictions).									
Siskiyou									3
Solano	1		2		1	2			2
Sonoma	1	1		1					6
Stanislaus		3							1
Sutter									2
Tehama		1							1
Trinity (no convictions).									
Tulare		2	1						8
Tuolumne			1						1
Ventura	1		1			1			7
Yolo									3
Yuba			1						3
Totals	18	30	21	3	6	11	5	4	240

TABLE II. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Laundry workers.	Lawyers.	Machinists.	Merchants.	Miners.	Molders.	Musicians.	Nurses.	Painters.
Alameda	1		2						3
Alpine (no convictions).									
Amador					3				
Butte					1	1			
Calaveras					2				
Colusa									
Contra Costa						1			
Del Norte									
El Dorado									
Fresno			1		1				1
Glenn									
Humboldt									
Imperial									
Inyo					4				
Kern	1		2		1				1
Kings			1						
Lake (no convictions).									
Lassen									
Los Angeles	2	1	2	1	3			2	6
Madera									
Marin	1								1
Mariposa									
Mendocino									
Merced			1						
Modoc									
Mono (no convictions).									
Monterey			1		1				
Napa									
Nevada									
Orange		1	2						1
Placer									1
Plumas									
Riverside				1					
Sacramento			2		1				
San Benito					1				
San Bernardino							1		
San Diego			1		1				2
San Francisco	1	1	11	3	3		1	2	5
San Joaquin	1						1		
San Luis Obispo									
San Mateo									
Santa Barbara			1				1		1
Santa Clara									3
Santa Cruz									
Shasta	1				2				
Sierra (no convictions).									
Siskiyou					1				
Solano					1				
Sonoma				1		1		1	
Stanislaus					1				
Sutter									1
Tehama									
Trinity (no convictions).									
Tulare					1				
Tuolumne									
Ventura									2
Yolo					1				
Yuba			2						1
Totals	8	3	29	6	29	3	4	5	29

TABLE II. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Plasterers	Plumbers	Printers	Sailors	Salesmen	Shoemakers	Steamfitters	Stewards	Stonecutters
Alameda		1			1				
Alpine (no convictions).									
Amador			1						
Butte			1						
Calaveras									
Colusa									
Contra Costa		1							
Del Norte									
El Dorado									
Fresno			1		1				
Glenn									
Humboldt									
Imperial									
Inyo									
Kern			1	1	1	1			
Kings							1		
Lake (no convictions).									
Lassen									
Los Angeles	3		3	3	2	4			2
Madera						1			
Marin									
Mariposa									
Mendocino									
Merced							1		
Modoc									
Mono (no convictions).									
Monterey									
Napa									
Nevada									
Orange									
Placer		2						1	1
Plumas									
Riverside									
Sacramento		1	1	1		1			1
San Benito									
San Bernardino						1			
San Diego			1	1					
San Francisco			3	4		4	3	1	1
San Joaquin		1	1	1					
San Luis Obispo									
San Mateo									
Santa Barbara									
Santa Clara					1	1			
Santa Cruz									
Shasta				1		1		1	
Sierra (no convictions).									
Siskiyou									
Solano				1				1	
Sonoma				1		1			
Stanislaus									
Sutter									
Tehama			1				1		
Trinity (no convictions).									
Tulare		1							
Tuolumne									
Ventura					1				
Yolo									
Yuba									
Totals	3	7	14	14	7	15	6	4	

TABLE II. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1909—Continued. (Tabulated by Counties.)

Counties.	Switchmen	Tailors	Teachers	Teamsters	Telegraphers	Tinners	Unclassified	Upholsterers	Waiters
Alameda		1		1			5	2	2
Alpine (no convictions).									
Amador							1		
Butte				1					1
Calaveras									
Colusa									1
Contra Costa				2			2		
Del Norte		1							
El Dorado									
Fresno				2		1	1		
Glenn				1					
Humboldt									
Imperial							2		
Inyo							1		
Kern		2		2			4		1
Kings			1				1		
Lake (no convictions).									
Lassen							1		
Los Angeles		5		8			11		6
Madera				1					
Marin	1	1							
Mariposa									
Mendocino				1					
Merced				1					
Modoc									
Mono (no convictions).									
Monterey							2		
Napa					1				
Nevada				1					
Orange		1					1		
Placer				1			2		
Plumas									
Riverside				1					
Sacramento	1	1		2			5		4
San Benito									
San Bernardino		2		1	1		5		
San Diego		1		1			6		2
San Francisco	1	7	1	7	1	1	10	1	14
San Joaquin				3		1	3		2
San Luis Obispo				1			3		2
San Mateo					1		1		
Santa Barbara									
Santa Clara	1			1			1		2
Santa Cruz				1			3		
Shasta							1		1
Sierra (no convictions).									
Siskiyou				1			2		
Solano		1		1					
Sonoma			1	1			1		
Stanislaus									1
Sutter									
Tehama							1		
Trinity (no convictions).									
Tulare							1		1
Tuolumne									1
Ventura									
Yolo				2					
Yuba				1			1		
Totals	4	23	3	46	4	3	78	3	41

TABLE III. Nature of Offense Committed by Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1909.

(Tabulated by Counties.)

Counties.	Totals.	Arson.	Assault.	Bigamy.	Bribery.	Burglary.	Crime against nature.	Dynamiting.
Alameda	66		7	1		25		1
Alpine (no convictions).								
Amador	11					5	1	
Butte	13		1			5		
Calaveras	2					2		
Colusa	7					1		
Contra Costa	15		3			6		2
Del Norte	5		1			3		
El Dorado	2					2		
Fresno	37		1			9	1	
Glenn	1							
Humboldt	4							
Imperial	9		1			4		
Inyo	5							
Kern	41		3	1		17		
Kings	9		1			2	1	
Lake (no convictions).								
Lassen	1					1		
Los Angeles	167	2	9			60	1	1
Madera	5					2		
Marin	10					5		
Mariposa	1							
Mendocino	7		3			2		
Merced	12		3			5		
Modoc	2							
Mono (no convictions).								
Monterey	14		1			3		
Napa	4							
Nevada	1					1		
Orange	13		1			3		
Placer	26		1			9		
Plumas	4							
Riverside	9		1			4		
Sacramento	59		1	1		24		
San Benito	3					1		
San Bernardino	24		1	1		5		
San Diego	29		1	1		7		
San Francisco	157	2	4	1		65	3	
San Joaquin	41	1				14		
San Luis Obispo	10					6		
San Mateo	5					3		
Santa Barbara	10					4		
Santa Clara	26	3		1		9		
Santa Cruz	11		2			5		
Shasta	17		1			5		
Sierra (no convictions).								
Siskiyou	7					2		
Solano	18		2			9		
Sonoma	22		5			8		
Stanislaus	8		1			3		
Sutter	3					3		
Tehama	6					4		
Trinity (no convictions).								
Tulare	20	1	3			7		
Tuolumne	4							
Ventura	14					1		
Yolo	6					1		
Yuba	14	1				6	1	
Totals	1017	10	58	7		368	8	4

TABLE III. Nature of Offense Committed by Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1909—Continued.

(Tabulated by Counties.)

Counties.	Embezzlement	Extortion	Felonies specified	Forgery	Grand larceny	Jail breaking	Kidnaping	Manslaughter
Alameda	5		2	8	6			1
Alpine (no convictions).								
Amador	1				2	1		
Butte				2	3			
Calaveras								
Colusa					5			
Contra Costa				1	2			
Del Norte								
El Dorado								
Fresno	3	1		4	1		2	1
Glenn				1				
Humboldt		1		2	1			
Imperial					1			2
Inyo				1	1			
Kern	1		3	4	4			1
Kings				4	1			
Lake (no convictions).								
Lassen								
Los Angeles	6		7	13	18			4
Madera	1		1		1			
Marin				1				2
Mariposa	1							
Mendocino					1			
Merced				2	1			
Modoc					1			1
Mono (no convictions).								
Monterey				3	3			
Napa				3				
Nevada								
Orange	1		3	1	2			1
Placer			2	2	4			
Plumas			2					1
Riverside								2
Sacramento			1	3	15			1
San Benito				1	1			
San Bernardino	1		1	5	3			1
San Diego			2	2	6			1
San Francisco	7		6	8	26			3
San Joaquin			2	4	7			
San Luis Obispo				2	2			
San Mateo			1					
Santa Barbara	1		1					1
Santa Clara			2	1	4			1
Santa Cruz				1	1			
Shasta			2	3	2			1
Sierra (no convictions).								
Siskiyou			1		1			1
Solano	1			1	3			
Sonoma			2		3			
Stanislaus					4			
Sutter								
Tehama						2		
Trinity (no convictions).								
Tulare			2	3				
Tuolumne					2		1	
Ventura				4	3			
Yolo						3		1
Yuba				1				
Totals	29	2	43	91	143	6	3	27

TABLE III. Nature of Offense Committed by Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1909—Continued.

(Tabulated by Counties.)

Counties.	Mayhem.	Murder.	Obtaining money under false pretenses.	Passing fictitious checks.	Perjury.	Prior.	Rape.	Receiving stolen property.	Robbery.
Alameda		4		4		1	1		
Alpine (no convictions).									
Amador								1	
Butte		1							1
Calaveras									
Colusa							1		
Contra Costa									1
Del Norte							1		
El Dorado									
Fresno		2		4	1	3	2		2
Glenn									
Humboldt									
Imperial									1
Inyo									3
Kern		1					2		4
Kings									
Lake (no convictions).									
Lassen									
Los Angeles	1	4		10	1	9	8	2	11
Madera									
Marin							1		1
Mariposa									
Mendocino		1							
Merced									1
Modoc									
Mono (no convictions).									
Monterey		2		1			1		
Napa									1
Nevada									
Orange				1					
Placer							1		7
Plumas		1							
Riverside							2		
Sacramento		2	1	1			4		5
San Benito									
San Bernardino		1	1				1		3
San Diego		2		4			1		2
San Francisco		9		6	1		3		13
San Joaquin		4		4					5
San Luis Obispo									
San Mateo							1		
Santa Barbara			1			1			1
Santa Clara		3					2		
Santa Cruz							2		
Shasta		1		1			1		
Sierra (no convictions).									
Siskiyou		2							
Solano				1					1
Sonoma		1		1		1	1		
Stanislaus									
Sutter									
Tehama									
Trinity (no convictions).									
Tulare	1					2	1		
Tuolumne							1		
Ventura				1			2		1
Yolo									1
Yuba				1		1	1		2
Totals	2	41	3	40	3	18	41	3	67

TABLE IV. Length of Sentence for Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1909. (Tabulated by Counties.)

Counties.	Totals.	Under 2 years.	2 to 5 years.	6 to 10 years.	11 to 20 years.	Over 20 years.	Life.	Death.
Alameda	66	13	22	23	4		3	1
Alpine (no convictions).								
Amador	11	2	9					
Butte	13	1	3	4	3		2	
Calaveras	2		2					
Colusa	7		5	2				
Contra Costa	15	3	2	3	5	2		
Del Norte	5	4	1					
El Dorado	2		2					
Fresno	37	12	16	3	3	1	1	1
Glenn	1		1					
Humboldt	4	1	3					
Imperial	9	1	7	1				
Inyo	5		5					
Kern	41	2	23	15	1			
Kings	9	2	5	2				
Lake (no convictions).								
Lassen	1			1				
Los Angeles	167	23	100	27	8	4	4	1
Madera	5		1	4				
Marin	10		5	3	1		1	
Mariposa	1	1						
Mendocino	7	2	3		2			
Merced	12		9	3				
Modoc	2		1	1				
Mono (no convictions).								
Monterey	14	2	8	1			2	1
Napa	4		1	2		1		
Nevada	1		1					
Orange	13	5	8					
Placer	26	2	9	9	4	2		
Plumas	4	1	1	1			1	
Riverside	9	1	4	3	1			
Sacramento	59	1	32	16	5	4	1	
San Benito	3	1	2					
San Bernardino	24	9	6	7		1	1	
San Diego	29	6	21				1	1
San Francisco	157	34	81	19	10	5	7	1
San Joaquin	41	4	21	5	5	3	2	1
San Luis Obispo	10	4	6					
San Mateo	5	4		1				
Santa Barbara	10	2	6	2				
Santa Clara	26	4	13	6	2		1	
Santa Cruz	11	5	4	2				
Shasta	17		11	3	2		1	
Sierra (no convictions).								
Siskiyou	7	2	2			1	2	
Solano	18	5	11	1	1			
Sonoma	22	5	13	3	1			
Stanislaus	8	2	3	3				
Sutter	3		1		2			
Tehama	6	2	4					
Trinity (no convictions).								
Tulare	20	9	6	2	1		2	
Tuolumne	4	1	1	1	1			
Ventura	14	4	8	2				
Yolo	6	3	2		1			
Yuba	14	1	8	2	3			
Totals	1017	186	519	183	66	24	32	7

TABLE V. Ages of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910. (Tabulated by Counties.)

Counties.	Total number of felonies	Sex.		Age.					
		Total males.	Total females.	Under 15 years	15 to 19 years	20 to 29 years	30 to 39 years	40 to 49 years	50 years and over
Alameda	77	74	3		6	35	21	12	3
Alpine (no convictions).									
Amador	1	1				1			
Butte	19	19			4	7	2	4	2
Calaveras	5	5					1	1	3
Colusa	5	5				3	1	1	
Contra Costa	11	11				6	5		
Del Norte	3	3				1	1		1
El Dorado	1	1					1		
Fresno	46	46			1	16	19	7	3
Glenn	5	5				2	2	1	
Humboldt	13	13			1	11			1
Imperial	3	3				2	1		
Inyo	4	4				1	2		1
Kern	48	48			6	18	14	5	5
Kings	7	7				5			2
Lake	5	5			2		1	1	1
Lassen	2	2				2			
Los Angeles	157	156	1		6	74	44	24	9
Madera	4	4				2		1	1
Marin	7	7				2	3		2
Mariposa	3	2	1			1	1	1	
Mendocino	3	3				1	1		1
Merced	8	8			1	4	1	2	
Modoc (no convictions).									
Mono (no convictions).									
Monterey	10	10				4	3	2	1
Napa	5	5					3		2
Nevada	2	2				1		1	
Orange	7	7			1	4	2		
Placer	31	31			2	10	13	5	1
Plumas	2	2				1			1
Riverside	14	14				6	4	2	2
Sacramento	54	54			3	21	14	14	2
San Benito	4	4			1	1		1	1
San Bernardino	33	33			5	14	5	6	3
San Diego	20	19	1		2	9	2	3	4
San Francisco	139	139			11	62	39	11	16
San Joaquin	49	48	1		5	21	14	5	4
San Luis Obispo	8	8			2	2	3	1	
San Mateo	4	4				1	2	1	
Santa Barbara	9	9				6	2		1
Santa Clara	24	24			2	9	6	4	3
Santa Cruz	10	10			1	5	1	2	1
Shasta	11	11			2	8	1		
Sierra	1	1					1		
Siskiyou	9	9			1	3	1	4	
Solano	15	15			1	5	4	3	2
Sonoma	19	19			2	6	5	3	3
Stanislaus	9	9				3	4	2	
Sutter	2	2					1	1	
Tehama	7	7			1	1	1	3	1
Trinity	1	1				1			
Tulare	11	11				7	2	1	1
Tuolumne	7	7			1	1	1	3	1
Ventura	13	13				8	4		1
Yolo	4	4				4			
Yuba	7	7			1	3	1		2
Totals	978	971	7		71	421	260	138	88

TABLE VI. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910. (Tabulated by Counties.)

Counties.	Totals.	Actors.	Bakers.	Blacksmiths.	Barbers.	Boiler makers.	Bookkeepers.	Brakemen.	Bricklayers.
Alameda	77	2	1	1	2	1	5	.....	1
Alpine (no convictions).									
Amador	1	.....	.....	.....	.....	.....	.....	.....	.....
Butte	19	.....	.....	1	.....	1	.....	.....	.....
Calaveras	5	.....	.....	.....	1	.....	.....	.....	.....
Colusa	5	.....	.....	.....	2	.....	.....	.....	.....
Contra Costa	11	.....	1	.....	.....	1	.....	.....	.....
Del Norte	3	.....	.....	.....	.....	.....	.....	.....	.....
El Dorado	1	.....	.....	1	.....	.....	.....	.....	.....
Fresno	46	.....	.....	3	2	.....	1	.....	.....
Glenn	5	.....	.....	.....	.....	.....	1	.....	.....
Humboldt	13	.....	.....	1	.....	.....	.....	.....	.....
Imperial	3	.....	.....	1	.....	.....	.....	.....	.....
Inyo	4	.....	.....	.....	.....	.....	.....	.....	.....
Kern	48	.....	.....	.....	.....	1	1	.....	.....
Kings	7	.....	.....	1	.....	.....	.....	.....	.....
Lake	5	.....	1	.....	.....	.....	.....	.....	.....
Lassen	2	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles	157	.....	4	2	2	.....	5	.....	1
Madera	4	.....	.....	.....	.....	.....	.....	.....	.....
Marin	7	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa	3	.....	.....	.....	.....	.....	.....	.....	.....
Mendocino	3	.....	.....	.....	.....	.....	.....	.....	.....
Merced	8	.....	.....	.....	.....	.....	1	.....	.....
Modoc (no convictions).									
Mono (no convictions).									
Monterey	10	.....	.....	.....	1	.....	.....	.....	.....
Napa	5	.....	.....	.....	.....	.....	.....	.....	.....
Nevada	2	.....	.....	.....	.....	.....	.....	.....	.....
Orange	7	.....	.....	2	.....	.....	.....	.....	.....
Placer	31	.....	.....	1	.....	1	1	.....	.....
Plumas	2	.....	.....	.....	.....	.....	.....	.....	.....
Riverside	14	.....	.....	.....	1	.....	.....	.....	.....
Sacramento	54	.....	.....	.....	2	1	3	.....	.....
San Benito	4	.....	.....	.....	.....	.....	.....	.....	.....
San Bernardino	33	.....	.....	.....	1	.....	.....	.....	2
San Diego	20	.....	.....	.....	1	.....	1	.....	1
San Francisco	139	1	1	2	3	2	1	.....	1
San Joaquin	49	.....	1	2	2	1	.....	.....	.....
San Luis Obispo	8	.....	.....	.....	.....	.....	1	.....	.....
San Mateo	4	.....	.....	.....	1	.....	.....	.....	.....
Santa Barbara	9	.....	.....	.....	1	.....	.....	.....	.....
Santa Clara	24	.....	1	.....	1	.....	.....	.....	.....
Santa Cruz	10	.....	.....	.....	.....	.....	1	.....	.....
Shasta	11	.....	.....	.....	.....	.....	.....	.....	.....
Sierra	1	.....	.....	.....	.....	.....	.....	.....	.....
Siskiyou	9	.....	.....	.....	.....	.....	1	.....	.....
Solano	15	.....	.....	.....	.....	.....	1	.....	.....
Sonoma	19	.....	.....	.....	.....	.....	1	.....	.....
Stanislaus	9	.....	.....	1	.....	.....	.....	.....	.....
Sutter	2	.....	.....	.....	.....	.....	.....	.....	.....
Tehama	7	.....	.....	.....	.....	.....	.....	.....	.....
Trinity	1	.....	.....	.....	.....	.....	.....	.....	.....
Tulare	11	1	.....	.....	.....	.....	.....	.....	.....
Tuolumne	7	.....	.....	.....	.....	.....	.....	.....	.....
Ventura	13	.....	.....	.....	1	.....	.....	.....	.....
Yolo	4	.....	.....	.....	.....	.....	.....	.....	.....
Yuba	7	.....	.....	.....	.....	.....	1	.....	.....
Totals	978	4	10	19	24	9	26	.....	6

TABLE VI. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Butchers	Carpenters	Chauffeurs	Cigar makers	Clerks	Cooks	Doctors	Electricians	Engineers
Alameda	------	1	1	------	8	4	1	1	1
Alpine (no convictions).									
Amador	------	------	------	------	------	------	------	------	------
Butte	------	------	------	------	------	1	------	------	------
Calaveras	1	------	------	------	------	------	------	------	------
Colusa	------	------	------	------	------	------	------	------	------
Contra Costa	------	------	------	------	------	------	------	1	1
Del Norte	------	------	------	------	------	1	------	------	------
El Dorado	------	------	------	------	------	------	------	------	------
Fresno	------	6	------	1	1	1	------	------	1
Glenn	------	1	------	------	------	1	------	------	------
Humboldt	------	1	------	------	------	------	------	------	------
Imperial	------	1	------	------	------	------	------	------	------
Inyo	------	1	------	------	------	------	------	------	------
Kern	1	1	------	------	------	3	------	------	------
Kings	------	------	------	------	------	------	------	------	------
Lake	------	------	------	------	------	------	------	------	------
Lassen	------	------	------	------	------	------	------	------	------
Los Angeles	1	6	------	1	6	13	2	4	1
Madera	------	------	------	------	------	------	------	------	------
Marin	------	1	------	------	------	1	------	------	------
Mariposa	------	------	------	------	1	------	------	------	------
Mendocino	------	------	------	------	------	------	------	------	------
Merced	------	------	------	------	------	------	------	------	1
Modoc (no convictions).									
Mono (no convictions).									
Monterey	------	------	------	------	1	1	------	------	1
Napa	------	1	------	------	------	1	------	------	------
Nevada	------	------	------	------	------	1	------	------	------
Orange	------	1	------	------	------	------	------	------	------
Placer	------	3	------	------	1	5	------	------	------
Plumas	------	------	------	------	------	------	------	------	------
Riverside	1	------	------	------	1	------	------	------	1
Sacramento	1	3	------	------	3	7	------	2	------
San Benito	------	------	------	------	------	1	------	------	------
San Bernardino	------	2	------	------	2	------	------	------	------
San Diego	1	1	------	------	------	------	------	------	------
San Francisco	------	7	------	------	8	12	2	3	1
San Joaquin	------	------	1	------	------	2	------	1	2
San Luis Obispo	------	------	------	------	------	------	------	------	------
San Mateo	------	------	------	------	------	------	------	------	------
Santa Barbara	------	------	------	------	------	1	------	------	------
Santa Clara	------	2	------	------	------	3	------	------	2
Santa Cruz	------	1	------	------	------	------	------	------	------
Shasta	------	------	------	------	------	1	------	------	------
Sierra	------	------	------	------	------	------	------	------	------
Siskiyou	------	2	------	------	------	------	------	------	------
Solano	------	------	------	------	------	2	------	------	------
Sonoma	------	------	------	------	1	------	------	------	------
Stanislaus	------	------	------	------	------	------	------	------	------
Sutter	------	------	------	------	------	------	------	------	------
Tehama	------	------	------	------	------	------	------	------	------
Trinity	------	------	------	------	------	------	------	------	------
Tulare	------	------	------	------	------	1	------	------	------
Tuolumne	------	2	------	------	------	3	------	------	------
Ventura	------	------	------	------	2	------	------	------	------
Yolo	------	------	------	------	------	2	------	------	------
Yuba	------	2	------	------	------	------	------	------	------
Totals	6	46	2	2	35	68	5	12	12

TABLE VI. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Farmers	Firemen	Fishermen	Gardeners	Hostlers	Housewives	Iron workers	Laborers	Laundry workers
Alameda					1	2		5	1
Alpine (no convictions).									
Amador								1	
Butte		1						7	
Calaveras	2								
Colusa		1			1			1	
Contra Costa								3	
Del Norte								1	
El Dorado									
Fresno	3	1		1			1	14	
Glenn					1			1	
Humboldt	2							5	
Imperial								1	
Inyo									
Kern		3						10	
Kings	1							2	
Lake	1							2	
Lassen								2	
Los Angeles	2	2		2	1			27	2
Madera								2	
Marin								2	
Mariposa						1			
Mendocino								3	
Merced								3	
Modoc (no convictions).									
Mono (no convictions).									
Monterey								3	
Napa									
Nevada									
Orange	1							2	
Placer	1	1						6	
Plumas									
Riverside								6	
Sacramento		3						5	2
San Benito	2								
San Bernardino				1				14	
San Diego		1				1		6	
San Francisco		1			1		1	18	
San Joaquin		1						10	
San Luis Obispo	1						1	3	
San Mateo									1
Santa Barbara	1	1						2	1
Santa Clara	2	1			1			4	
Santa Cruz		1						3	
Shasta	1							2	
Sierra									
Siskiyou	1							3	
Solano		2						1	
Sonoma	1	1		1				5	
Stanislaus								1	
Sutter								1	
Tehama								3	
Trinity								1	
Tulare	1	1						5	
Tuolumne								1	1
Ventura								6	
Yolo								1	
Yuba								3	
Totals	23	22		5	6	4	3	207	8

TABLE VI. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Lawyers.	Machinists.	Merchants.	Miners.	Molders.	Musicians.	Nurses.	Painters.	Plasterers.
Alameda	1	3	3		1	1	1		
Alpine (no convictions).									
Amador									
Butte		2		1		1			
Calaveras		1							
Colusa									
Contra Costa		1						1	
Del Norte									
El Dorado									
Fresno				1			1		
Glenn									
Humboldt									
Imperial									
Inyo				1					
Kern		1		1				1	
Kings									
Lake		1							
Lassen									
Los Angeles	1	2	3	1	1	1	2	5	
Madera									
Marin									
Mariposa			1						
Mendocino									
Merced									
Modoc (no convictions).									
Mono (no convictions).									
Monterey								1	
Napa									1
Nevada				1					
Orange								1	
Placer		2		2			1		
Plumas		1		1					
Riverside				3					
Sacramento		3	1	2				3	
San Benito			1						
San Bernardino				2				1	
San Diego				2				1	
San Francisco		7	1	1				4	
San Joaquin			1	3		1		4	
San Luis Obispo									
San Mateo	1								
Santa Barbara		1							
Santa Clara								1	
Santa Cruz		1							
Shasta				1				1	
Sierra				1					
Siskiyou	1								
Solano		1	1				1	1	1
Sonoma				1					
Stanislaus				1					
Sutter		1							
Tehama				1					
Trinity									
Tulare				1				1	
Tuolumne									
Ventura									
Yolo									
Yuba									
Totals	4	28	12	28	2	4	6	26	2

TABLE VI. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Plumbers	Printers	Sailors	Salesmen	Shoemakers	Steamfitters	Stewards	Stonecutters	Switchmen
Alameda		1	1	4	2				
Alpine (no convictions).									
Amador									
Butte				1					
Calaveras									
Colusa									
Contra Costa									
Del Norte									
El Dorado									
Fresno				1					
Glenn									
Humboldt			1		1				
Imperial									
Inyo									1
Kern	1		1	1	2			1	
Kings									
Lake									
Lassen									
Los Angeles	1			4	4		1		
Madera	1								
Marin									
Mariposa									
Mendocino									
Merced					1				
Modoc (no convictions).									
Mono (no convictions)									
Monterey									
Napa			1						
Nevada									
Orange									
Placer		1							
Plumas									
Riverside									
Sacramento		1			3				
San Benito									
San Bernardino				1					
San Diego			2						
San Francisco	3	2	5	4	4				
San Joaquin			1		1				
San Luis Obispo									
San Mateo									
Santa Barbara									
Santa Clara			1		1				
Santa Cruz									
Shasta									
Sierra									
Siskiyou			1						
Solano			1						
Sonoma			1						
Stanislaus	1								
Sutter									
Tehama									
Trinity									
Tulare									
Tuolumne									
Ventura									
Yolo									
Yuba					1				
Totals	7	5	16	16	20		1	1	1

TABLE VI. Occupations of Persons Convicted of Felonies in California for the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Tailors	Teachers	Teamsters	Telegraphers	Tinners	Unclassified	Upholsterers	Waiters
Alameda	1		1	1		14		3
Alpine (no convictions).								
Amador								
Butte	2					1		
Calaveras								
Colusa								
Contra Costa			1			1		
Del Norte						1		
El Dorado								
Fresno	2		2			3		
Glenn								
Humboldt						2		
Imperial								
Inyo						1		
Kern			5			11		3
Kings						2		1
Lake								
Lassen								
Los Angeles	2		6	1		35		3
Madera						1		
Marin			1			2		
Mariposa								
Mendocino								
Merced								2
Modoc (no convictions).								
Mono (no convictions).								
Monterey			1			1		
Napa						1		
Nevada								
Orange								
Placer			3			1		1
Plumas								
Riverside						1		
Sacramento	1					4		4
San Benito								
San Bernardino			1			6		
San Diego	1					1		
San Francisco	8		7			19	1	8
San Joaquin	1		3			4		7
San Luis Obispo			1			1		
San Mateo						1		
Santa Barbara			1					
Santa Clara			1					3
Santa Cruz						2		1
Shasta			2					3
Sierra								
Siskiyou								
Solano						3		
Sonoma		1				5		1
Stanislaus			1			2		2
Sutter								
Tehama			1			2		
Trinity								
Tulare								
Tuolumne								
Ventura	1		1			2		
Yolo						1		
Yuba								
Totals	19	1	39	2		131	1	42

TABLE VII. Nature of Offense Committed by Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1910.
(Tabulated by Counties.)

Counties.	Totals.	Arson.	Assault.	Bigamy.	Burglary.	Crime against nature.	Dynamiting.	Embezzlement.	Extortion.
Alameda	77		1		34			3	
Alpine (no convictions).									
Amador	1	1							
Butte	19		2		12				
Calaveras	5				2				
Colusa	5	1	1		1				
Contra Costa	11		3		6				
Del Norte	3		2		1				
El Dorado	1		1						
Fresno	46		3		10				
Glenn	5		1		2				
Humboldt	13				1			1	
Imperial	3				2				
Inyo	4		1						
Kern	48				25			1	
Kings	7				4				
Lake	5				1				
Lassen	2								
Los Angeles	157	1	6	1	49	2		6	
Madera	4				1				
Marin	7				4				
Mariposa	3		1						
Mendocino	3				2				
Merced	8		2		2				
Modoc (no convictions).									
Mono (no convictions).									
Monterey	10		2		2				
Napa	5				2				
Nevada	2								
Orange	7		1		3				
Placer	31		4		5				
Plumas	2								
Riverside	14				6				
Sacramento	54	2	5	1	26	1			
San Benito	4				1				
San Bernardino	33	1			16			1	
San Diego	20	2	5		6		1		
San Francisco	139		3		58	1		1	1
San Joaquin	49		4		25				1
San Luis Obispo	8				1				
San Mateo	4			1	1				
Santa Barbara	9		1		6				
Santa Clara	24			1	9			1	
Santa Cruz	10		1	1	1			1	
Shasta	11				5				
Sierra	1				1				
Siskiyou	9		1		2				
Solano	15				7			1	
Sonoma	19		1		7			3	
Stanislaus	9				4				
Sutter	2								
Tehama	7		1		1				
Trinity	1					1			
Tulare	11		1		4				
Tuolumne	7				1				
Ventura	13				3				
Yolo	4				1				
Yuba	7		2			2			
Totals	978	8	56	5	363	7	1	19	2

TABLE VII. Nature of Offense Committed by Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1910—Continued.

(Tabulated by Counties.)

Counties.	Felony not specified	Forgery	Grand larceny	Incest	Kidnaping	Lewd and lascivious acts	Manslaughter	Mayhem
Alameda	5	4	8		2		2	
Alpine (no convictions).								
Amador								
Butte		2	1					
Calaveras			2					
Colusa			1	1				
Contra Costa							1	
Del Norte								
El Dorado								
Fresno	1	15	6			1	4	
Glenn		1	1					
Humboldt			4			1		
Imperial		1						
Inyo	1		1					
Kern	2	5	6					
Kings								
Lake			1					
Lassen	1		1					
Los Angeles	7	11	22			3	4	
Madera						1	1	
Marin			1					
Mariposa		1						
Mendocino			1					
Merced		2						
Modoc (no convictions).								
Mono (no convictions).								
Monterey		1	2				1	
Napa			1				1	
Nevada								
Orange		3						
Placer	1	9	5					
Plumas	1							
Riverside	3	1	2				1	
Sacramento	4	1	4					
San Benito		1				1		
San Bernardino	1	5	4				2	
San Diego	1		1	1	1	1		
San Francisco	2	4	20	1		5	1	
San Joaquin	1	3	8					
San Luis Obispo			3					
San Mateo		1					1	
Santa Barbara			1					
Santa Clara		2	4					
Santa Cruz		2	2					
Shasta	1	1	2					
Sierra								
Siskiyou	1	1	1				1	
Solano						2		
Sonoma	1		4					
Stanislaus			3					
Sutter		1	1					
Tehama							2	
Trinity								
Tulare	2	1	1	1			1	
Tuolumne			1					1
Ventura		2	1			1	2	
Yolo		1	1					
Yuba		1	1					
Totals	36	84	130	4	3	16	30	1

TABLE VII. Nature of Offense Committed by Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1910—Continued.

(Tabulated by Counties.)

Counties.	Murder	Obtaining money under false pretenses	Passing fictitious check	Perjury	Prior	Rape	Receiving stolen property	Robbery
Alameda		1	10		1	3		3
Alpine (no convictions).								
Amador								
Butte			1			1		
Calaveras			1					
Colusa								
Contra Costa	1							
Del Norte								
El Dorado								
Fresno	1		1					4
Glenn								
Humboldt					1			5
Imperial								
Inyo	1							
Kern	1	2			1		2	3
Kings	1				1	1		
Lake	2			1				
Lassen								
Los Angeles	7	4	8	1	7	10	2	6
Madera	1							
Marin				1	1			
Mariposa	1							
Mendocino								
Merced			1					1
Modoc (no convictions).								
Mono (no convictions).								
Monterey	2							
Napa			1					
Nevada			1					1
Orange								
Placer								7
Plumas						1		
Riverside	1							
Sacramento	1	1			1	1		6
San Benito								
San Bernardino	2					1		
San Diego	1		1			1		
San Francisco	6	1	3		1	1		23
San Joaquin	3		1					3
San Luis Obispo	1					2		1
San Mateo								
Santa Barbara						1		
Santa Clara	2					1		1
Santa Cruz		1	1					
Shasta								2
Sierra								
Siskiyou								1
Solano		1	3				1	
Sonoma	1	1	1					
Stanislaus								2
Sutter								
Tehama						2		
Trinity								
Tulare					1			
Tuolumne								1
Ventura	2				1			1
Yolo	1							
Yuba					1			
Totals	39	12	34	3	17	26	5	77

TABLE VIII. Length of Sentence for Persons Convicted of Felonies in California during the Fiscal Year ending June 30, 1910—Continued. (Tabulated by Counties.)

Counties.	Totals.	Under 2 years.	2 to 5 years.	6 to 10 years.	11 to 20 years.	Over 20 years.	Life.	Death.
Alameda	77	15	41	12	8	1	------	------
Alpine (no convictions).								
Amador	1	------	------	------	1	------	------	------
Butte	19	10	5	2	1	------	1	------
Calaveras	5	4	1	------	------	------	------	------
Colusa	5	1	1	3	------	------	------	------
Contra Costa	11	------	8	1	1	1	------	------
Del Norte	3	3	------	------	------	------	------	------
El Dorado	1	1	------	------	------	------	------	------
Fresno	46	10	28	6	1	------	1	------
Glenn	5	1	1	2	1	------	------	------
Humboldt	13	2	11	------	------	------	------	------
Imperial	3	------	3	------	------	------	------	------
Inyo	4	------	3	------	------	------	1	------
Kern	48	------	35	12	------	------	1.	------
Kings	7	1	3	2	------	1	------	------
Lake	5	2	1	------	------	1	------	1
Lassen	2	1	1	------	------	------	------	------
Los Angeles	157	15	109	20	6	3	3	1
Madera	4	------	1	2	------	------	1	------
Marin	7	2	5	------	------	------	------	------
Mariposa	3	1	------	1	------	------	1	------
Mendocino	3	1	2	------	------	------	------	------
Merced	8	1	5	1	1	------	------	------
Modoc (no convictions).								
Mono (no convictions).								
Monterey	10	4	3	------	1	1	1	------
Napa	5	------	3	2	------	------	------	------
Nevada	2	1	------	------	1	------	------	------
Orange	7	1	6	------	------	------	------	------
Placer	31	5	18	7	1	------	------	------
Plumas	2	1	------	------	1	------	------	------
Riverside	14	2	9	2	------	------	1	------
Sacramento	54	4	28	12	6	2	2	------
San Benito	4	2	2	------	------	------	------	------
San Bernardino	33	5	23	2	------	1	2	------
San Diego	20	6	9	3	1	------	1	------
San Francisco	139	27	60	25	13	8	5	1
San Joaquin	49	13	22	10	------	1	3	------
San Luis Obispo	8	------	5	1	1	------	------	1
San Mateo	4	1	3	------	------	------	------	------
Santa Barbara	9	1	5	3	------	------	------	------
Santa Clara	24	7	10	4	1	------	2	------
Santa Cruz	10	3	7	------	------	------	------	------
Shasta	11	2	7	2	------	------	------	------
Sierra	1	1	------	------	------	------	------	------
Siskiyou	9	3	5	------	1	------	------	------
Solano	15	3	7	2	2	1	------	------
Sonoma	19	1	12	5	------	------	1	------
Stanislaus	9	4	1	------	4	------	------	------
Sutter	2	------	1	1	------	------	------	------
Tehama	7	------	4	2	1	------	------	------
Trinity	1	------	1	------	------	------	------	------
Tulare	11	5	4	1	1	------	------	------
Tuolumne	7	1	4	1	1	------	------	------
Ventura	13	3	4	5	------	------	1	------
Yolo	4	1	2	------	------	------	------	1
Yuba	7	1	3	2	1	------	------	------
Totals	978	179	532	156	57	21	28	5

TABLE IX. Persons Convicted of Felonies and Admitted to Probation for the Two Fiscal Years ending June 30, 1910. (By Counties.)

Counties.	1908-09.			1909-10.		
	Total.	Male.	Female.	Total.	Male.	Female.
Alameda	21	18	3	28	26	2
Alpine	no probations.			no probations.		
Amador	no probations.			2	2	
Butte	no probations.			3	3	
Calaveras	no probations.			no probations.		
Colusa	no probations.			no probations.		
Contra Costa	2	2		4	4	
Del Norte	no returns.			no returns.		
El Dorado	no probations.			no probations.		
Fresno	7	7		11	11	
Glenn	1	1		no returns.		
Humboldt	no probations.			no probations.		
Imperial	2	2		2	2	
Inyo	no probations.			no returns.		
Kern	4	4		2	2	
Kings	no probations.			no probations.		
Lake	2	2		no probations.		
Lassen	no probations.			no returns.		
Los Angeles	70	66	4	85	83	2
Madera	3	3		no returns.		
Marin	no probations.			no probations.		
Mariposa	no probations.			no probations.		
Mendocino	no probations.			no returns.		
Merced	1	1		1	1	
Modoc	2	2		12	12	
Mono	no probations.			no probations.		
Monterey	2	2		3	3	
Napa	no probations.			no probations.		
Nevada	1	1		no probations.		
Orange	2	2		no probations.		
Placer	5	5		no probations.		
Plumas	no probations.			no probations.		
Riverside	no returns.			1	1	
Sacramento	5	5		61	61	
San Benito	no returns.			no returns.		
San Bernardino	6	6		23	23	
San Diego	17	17		12	11	1
San Francisco	33	32	1	75	69	6
San Joaquin	no probations.			no probations.		
San Luis Obispo	4	4		no returns.		
San Mateo	no probations.			1	1	
Santa Barbara	2	2		4	4	
Santa Clara	3	3		4	4	
Santa Cruz	6	6		no probations.		
Shasta	no probations.			no probations.		
Sierra	no probations.			no probations.		
Siskiyou	1	1		no probations.		
Solano	3	3		4	4	
Sonoma	14	14		3	3	
Stanislaus	4	4		1	1	
Sutter	no probations.			no probations.		
Tehama	no probations.			1	1	
Trinity	no probations.			no returns.		
Tulare	no probations.			no probations.		
Tuolumne	no probations.			no probations.		
Ventura	1	1		4	4	
Yolo	2	2		1	1	
Yuba	no probations.			no probations.		
Totals	226	218	8	348	337	11

TABLE X. Commitments to State Penitentiaries during the Years 1890 to 1909.

Counties.	1890.	1891.	1892.	1893.	1894.	1895.	1896.
Alameda	35	27	31	32	36	23	28
Alpine							
Amador	1	1	2	5	6	10	3
Butte	9	10	11	15	9	6	10
Calaveras	4	4	4	1	4	2	6
Colusa	4	15	3	3	3	3	1
Contra Costa	5	6	5	5	15	21	13
Del Norte	2		1			2	
El Dorado	2	2	1	2	1	5	2
Fresno	26	30	23	17	14	19	43
Glenn		3	1	1			
Humboldt	5	6	2	6	7	3	4
Imperial							
Inyo	2		3	1	5	5	2
Kern	17	10	9	17	13	13	13
Kings				3	6	9	10
Lake	2	5		2	2		
Lassen		3	1	1	4	3	
Los Angeles	48	36	69	73	89	106	102
Madera				2	2	3	5
Marin	4	2	3	2	1	3	4
Mariposa	5	2	1	1	1	3	3
Mendocino	8	5	7	6	10	9	3
Merced	6	4	3	7	7	9	9
Modoc	3	1	3		2	2	1
Mono					1		2
Monterey	6	11	6	7	6	9	8
Napa	10	12	14	6	13	9	13
Nevada	2	3	5	3	3	3	3
Orange	2	2	5	3	6	9	7
Placer	6	4	3	6	13	7	9
Plumas		1	3		1	2	1
Riverside				4	2	12	7
Sacramento	32	43	35	35	34	35	33
San Benito	3	3	7	2	8	12	11
San Bernardino	23	29	28	53	22	20	32
San Diego	13	10	14	11	20	9	16
San Francisco	201	187	165	237	205	188	185
San Joaquin	19	22	22	31	16	28	23
San Luis Obispo	2	7	5	10	18	18	18
San Mateo	5	5	5	11	5	12	16
Santa Barbara	5	6	11	5	4	7	8
Santa Clara	33	18	21	19	20	11	22
Santa Cruz	6	5	13	12	10	14	9
Shasta	10	6	3	8	3	3	11
Sierra	2	2		1		1	1
Siskiyou	6	8	4	3	5	4	1
Solano	6	7	11	14	9	8	19
Sonoma	7	13	17	17	23	16	15
Stanislaus	7	11	9	8	9	7	4
Sutter	1	1	2	1	2	2	
Tehama	10	6	5	7	9	15	3
Trinity	1			1	2	1	2
Tulare	14	12	12	9	4	13	18
Tuolumne	1		2	2	2	1	7
Ventura	1	9	3	8	5	4	2
Yolo	6	4	9	4	9	4	7
Yuba	10	12	13	9	11	10	4
Totals	638	631	635	749	747	753	779

TABLE X. Commitments to State Penitentiaries during the Years 1890 to 1909—Cont.

Counties.	1897.	1898.	1899.	1900.	1901.	1902.	1903.
Alameda	39	21	19	31	33	51	46
Alpine							
Amador	16	8	2	4	7	3	2
Butte	8	6	10	9	6	6	11
Calaveras	3	4	6	2	1	1	2
Colusa	10	1	2	2	3	2	3
Contra Costa	6	12	9	9	12	5	11
Del Norte	2		1	2	2	1	
El Dorado	3	8	5	4	4	2	1
Fresno	33	30	28	31	48	54	39
Glenn	1	1				2	3
Humboldt	2	4	4	3	5	3	8
Imperial							
Inyo	1	1		1		1	
Kern	13	22	12	13	17	11	15
Kings	11	14	11	7	7	13	10
Lake	1		1	2		6	2
Lassen	1	4	2	1			
Los Angeles	103	86	73	57	103	109	128
Madera	4	5	1	3	4	4	4
Marin		2	2	2	4	1	8
Mariposa	2	2	1	1	4	1	
Mendocino	5	3	2		3	5	8
Merced	10	8		4	8	5	5
Modoc	5	3				1	2
Mono	3						
Monterey	7	10	9	11	3	12	7
Napa	1	11	3	6	7	4	5
Nevada	2	8	3	5	4	4	2
Orange	6	11	9	3	10	8	5
Placer	5	6	1	11	8	14	2
Plumas		1		2	1		2
Riverside	8	11	8	9	7	9	16
Sacramento	27	24	29	24	30	28	30
San Benito	2	2	2	6	3	5	
San Bernardino	24	23	13	17	23	22	20
San Diego	11	4	16	6	10	8	15
San Francisco	162	146	147	112	124	160	132
San Joaquin	26	22	21	34	49	42	48
San Luis Obispo	19	27	5	8	10	9	10
San Mateo	7	11	4	3	8	10	4
Santa Barbara	4	8	11	9	5	4	11
Santa Clara	17	21	10	14	15	20	23
Santa Cruz	5	4	5	5	10	6	8
Shasta	13	6	11	7	10	17	15
Sierra	1	2	2	1	1	3	
Siskiyou	1	10	4	1	6	5	8
Solano	14	14	9	15	16	9	22
Sonoma	17	16	17	7	17	10	8
Stanislaus	5	6	5	3	4	12	12
Sutter	3	2	1		5	2	3
Tehama	6	1	2	7	6	10	6
Trinity	3	2	2	2	1	2	
Tulare	13	4	11	4	10	7	18
Tuolumne	3	5	7	6	2	4	1
Ventura	8	2	11	10	10	17	14
Yolo	9	6	3	5	3	2	8
Yuba	6	6		7	11	9	11
Totals	717	677	572	549	689	761	774

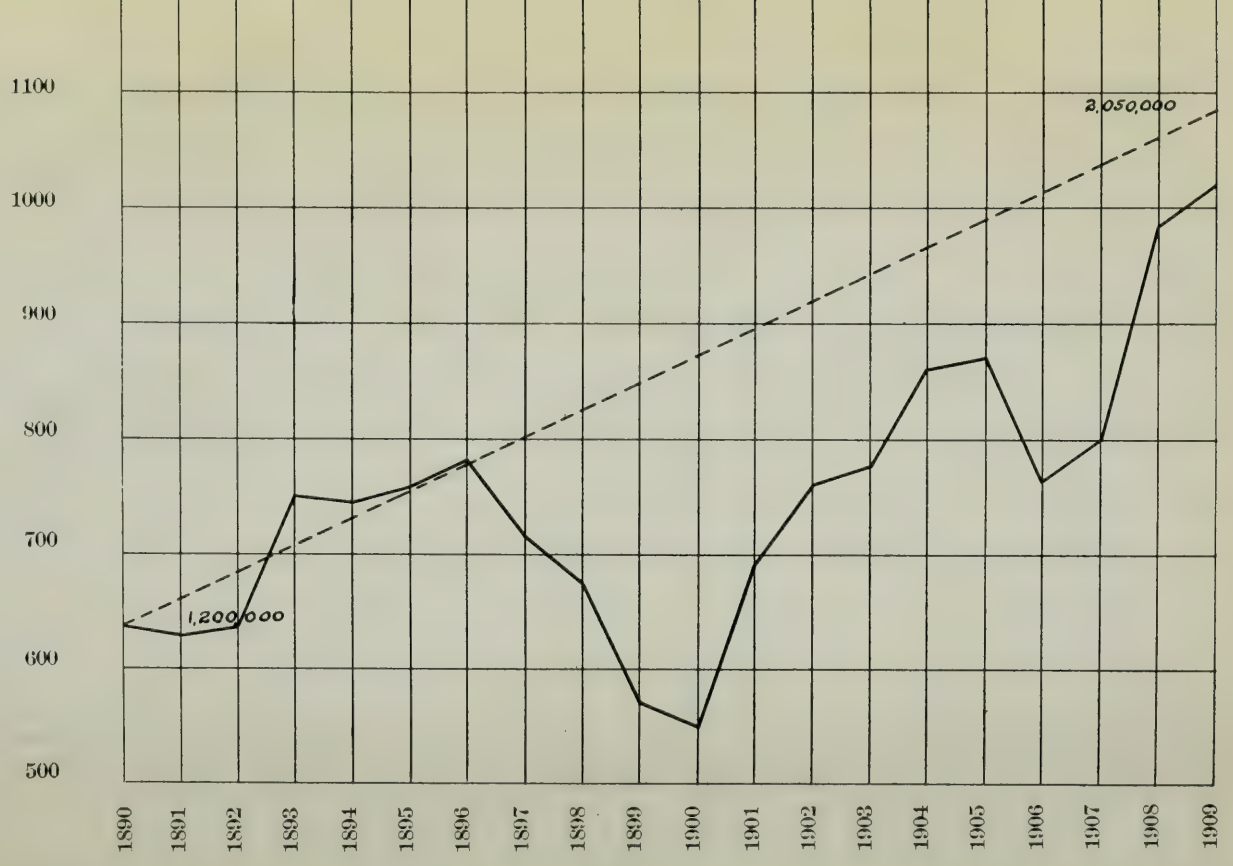
TABLE X. Commitments to State Penitentiaries during the Years 1890 to 1909—Cont.

Counties.	1904.	1905.	1906.	1907.	1908.	1909.	Total.
Alameda	35	32	50	72	81	64	786
Alpine	------	1	------	------	------	------	1
Amador	3	9	2	2	5	7	98
Butte	15	20	32	28	23	13	257
Calaveras	6	3	8	1	1	5	68
Colusa	4	3	4	8	6	5	85
Contra Costa	12	10	12	12	14	19	213
Del Norte	2	4	------	3	9	4	35
El Dorado	3	4	------	3	1	2	55
Fresno	47	49	28	33	33	39	664
Glenn	------	------	4	1	1	1	19
Humboldt	1	4	7	7	7	8	96
Imperial	------	------	------	1	11	7	19
Inyo	------	2	6	------	3	5	38
Kern	36	23	17	13	37	39	360
Kings	8	6	5	5	11	8	144
Lake	------	1	------	1	------	2	27
Lassen	2	------	1	1	4	2	30
Los Angeles	151	161	131	140	149	165	2079
Madera	3	3	2	2	7	2	56
Marin	2	2	6	4	2	12	66
Mariposa	2	------	1	4	1	3	38
Mendocino	13	4	10	10	10	4	125
Merced	4	9	3	10	8	15	134
Modoc	2	------	1	2	1	2	31
Mono	------	------	1	2	1	------	10
Monterey	6	14	6	11	19	14	182
Napa	10	5	8	7	7	5	156
Nevada	5	5	1	6	5	4	76
Orange	6	7	6	5	9	12	131
Placer	6	8	2	5	12	31	159
Plumas	------	1	------	1	4	6	26
Riverside	10	11	13	12	11	11	161
Sacramento	29	40	25	36	58	46	673
San Benito	7	2	2	1	2	6	86
San Bernardino	33	28	26	26	22	33	517
San Diego	16	16	16	15	28	24	278
San Francisco	167	142	105	113	131	163	3172
San Joaquin	41	48	43	43	43	39	660
San Luis Obispo	13	10	9	8	11	6	223
San Mateo	8	8	11	4	7	5	149
Santa Barbara	10	7	7	17	8	11	158
Santa Clara	29	17	25	10	18	32	395
Santa Cruz	14	17	7	5	15	9	179
Shasta	8	16	9	11	10	16	193
Sierra	1	------	1	------	------	------	19
Siskiyou	10	9	8	8	8	7	116
Solano	4	13	13	18	19	20	260
Sonoma	11	6	14	10	20	23	284
Stanislaus	11	18	9	8	11	9	168
Sutter	1	3	3	3	5	1	41
Tehama	5	11	5	8	10	9	141
Trinity	2	2	------	4	------	------	27
Tulare	14	22	26	8	26	12	257
Tuolumne	4	2	1	2	5	5	62
Ventura	10	10	14	14	21	10	183
Yolo	9	11	7	7	3	6	122
Yuba	11	12	13	9	12	11	187
Totals	862	871	766	800	986	1019	14975

CHART VII.

Commitments to State Penitentiaries, 1890 to 1909.

In this chart there is presented the number of commitments to the State penitentiaries from 1890 to 1909. It will be noted that the number of commitments for each year were in no way proportionate to the population. In fact, there seems to be no relation between the population and the number of commitments.


1100
1000
900
800
700
600
500
2,050,000
1,200,000
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
Commitments.
Curve of population.

JUVENILE CRIME

TABLE I. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Counties from which committed.)

Counties.	Total.	Male.	Female.
Alameda	31	25	6
Alpine			
Amador			
Butte	4	2	2
Calaveras			
Colusa	1	1	
Contra Costa	3	2	1
Del Norte	2	2	
El Dorado			
Fresno	22	19	3
Glenn			
Humboldt	1	1	
Imperial	2	2	
Inyo	1		1
Kern	1		1
Kings	1	1	
Lake	1	1	
Lassen	1	1	
Los Angeles	70	62	8
Madera	4	4	
Marin	1	1	
Mariposa			
Mendocino			
Merced	1	1	
Modoc			
Mono			
Monterey	9	6	3
Napa	2	2	
Nevada	1	1	
Orange	3	3	
Placer	2	1	1
Plumas			
Riverside	8	6	2
Sacramento	8	8	
San Benito	1	1	
San Bernardino	8	7	1
San Diego	2	2	
San Francisco	36	35	1
San Joaquin	5	3	2
San Luis Obispo	8	7	1
San Mateo	1	1	
Santa Barbara	11	10	1
Santa Clara	21	19	2
Santa Cruz	5	4	1
Shasta			
Sierra			
Siskiyou	1	1	
Solano			
Sonoma	9	9	
Stanislaus			
Sutter			
Tehama	1	1	
Trinity			
Tulare	4	4	
Tuolumne			
Ventura	5	5	
Yolo	5	5	
Yuba			
Totals	304	267	37

TABLE V. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Age of child at commitment.)

Age.	Total.	Male.	Female.
Eight years			
Nine years	3	3	
Ten years	2	2	
Eleven years	4	4	
Twelve years	16	15	1
Thirteen years	22	18	4
Fourteen years	35	27	8
Fifteen years	49	40	9
Sixteen years	66	58	8
Seventeen years	74	68	6
Eighteen years	17	16	1
Nineteen years	12	12	
Twenty years	4	4	
Not stated			
Totals	304	267	37

TABLE VI. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Age of child at commitment.)

Age.	Total.	Male.	Female.
Eight years	2	2	
Nine years			
Ten years	2	2	
Eleven years	8	8	
Twelve years	12	12	
Thirteen years	21	18	3
Fourteen years	31	26	5
Fifteen years	50	42	8
Sixteen years	62	52	10
Seventeen years	68	56	12
Eighteen years	35	29	6
Nineteen years	17	16	1
Twenty years	3	3	
Not stated	3	2	1
Totals	314	268	46

TABLE VII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Race of child committed.)

Race.	Total.	Male.	Female.
White	283	250	33
Chinese	2	2	
Indian	2	1	1
Malay			
Negro	17	14	3
Totals	304	267	37

TABLE VIII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Race of child committed.)

Race.	Total.	Male.	Female.
White	298	254	44
Chinese			
Indian			
Malay	1	1	
Negro	15	13	2
Totals	314	268	46

TABLE IX. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Place of Birth of child committed.)

Place of birth of child committed.	Total.	Male.	Female.
California	165	138	27
Rest of United States	109	100	9
Foreign	28	27	1
Not stated	2	2	
Totals	304	267	37

TABLE X. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Place of Birth of child committed.)

Place of birth of child committed.	Total.	Male.	Female.
California	159	127	32
Rest of United States	134	123	11
Foreign	20	17	3
Not stated	1	1	
Totals	314	268	46

TABLE XI. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Place of Birth of parents of child committed.)

Place of birth of parents.	Total.	Male.	Female.
Both parents born in United States	148	130	18
Father foreign born	25	18	7
Mother foreign born	15	13	2
Both parents foreign born	99	90	9
Not stated	17	16	1
Totals	304	267	37

TABLE XII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Place of Birth of parents of child committed.)

Place of birth of parents.	Total.	Male.	Female.
Both parents born in United States	176	150	26
Father foreign born	34	27	7
Mother foreign born	15	12	3
Both parents foreign born	63	54	9
Not stated	26	25	1
Totals	314	268	46

TABLE XIII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Age of child on leaving school.)

Age.	Total.	Male.	Female.
Seven years			
Eight years	3	3	
Nine years	4	3	1
Ten years	10	8	2
Eleven years	14	14	
Twelve years	33	30	3
Thirteen years	46	37	9
Fourteen years	57	45	12
Fifteen years	27	25	2
Sixteen years	19	19	
Seventeen years	5	5	
Not stated	83	75	8
No schooling	3	3	
Totals	304	267	37

TABLE XIV. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Age of child on leaving school.)

Age.	Total.	Male.	Female.
Seven years	3	3	
Eight years	1	1	
Nine years	2	2	
Ten years	11	11	
Eleven years	10	10	
Twelve years	30	28	2
Thirteen years	31	30	1
Fourteen years	46	37	9
Fifteen years	32	30	2
Sixteen years	15	13	2
Seventeen years	8	8	
Not stated	117	87	30
No schooling	8	8	
Totals	314	268	46

TABLE XV. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Grade reached by child on leaving school.)

Grade.	Total.	Male.	Female.
No schooling	3	3	
First grade	5	2	3
Second grade	15	14	1
Third grade	25	23	2
Fourth grade	42	38	4
Fifth grade	48	44	4
Sixth grade	53	47	6
Seventh grade	29	21	8
Eighth grade	30	26	4
High school	3	3	
University			
Not stated	51	46	5
Totals	304	267	37

TABLE XVI. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Grade reached by child on leaving school.)

Grade.	Total.	Male.	Female.
No schooling	8	8	
First grade	5	5	
Second grade	11	11	
Third grade	29	27	2
Fourth grade	37	34	3
Fifth grade	53	49	4
Sixth grade	51	37	14
Seventh grade	42	31	11
Eighth grade	33	29	4
High school	21	19	2
University	1	1	
Not stated	23	17	6
Totals	314	268	46

TABLE XVII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing Status of Parents of children committed.)

	Total.	Male.	Female.
Parents living together	107	95	12
Parents separated	37	28	9
Parents divorced	20	18	2
One parent dead	91	83	8
Both parents dead	31	26	5
Not stated	18	17	1
Totals	304	267	37

TABLE XVIII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing Status of Parents of children committed.

	Total.	Male.	Female.
Parents living together	124	112	12
Parents separated	31	23	8
Parents divorced	30	25	5
One parent dead	95	77	18
Both parents dead	21	21	----
Not stated	13	10	3
Totals	314	268	46

TABLE XIX. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing with whom child resided at time of commitment.)

Living with	Total.	Male.	Female.
Both parents	102	90	12
Father	29	26	3
Mother	79	68	11
Neither parent	26	23	3
Not stated	68	60	8
Totals	304	267	37

TABLE XX. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing with whom child resided at time of commitment.)

Living with	Total.	Male.	Female.
Both parents	111	102	9
Father	22	21	1
Mother	50	46	4
Neither parent	40	30	10
Not stated	91	69	22
Totals	314	268	46

TABLE XXI. Commitments to State Reform Schools for Fiscal Year ending June 30, 1909.

(Showing addiction of parents to liquor.)

Addicted to use of liquor.	Total.	Male.	Female.
Both parents	7	4	3
Father	61	50	11
Mother	4	4	
Neither parent	193	175	18
Not stated	39	34	5
Totals	304	267	37

TABLE XXII. Commitments to State Reform Schools for Fiscal Year ending June 30, 1910.

(Showing addiction of parents to liquor.)

Addicted to use of liquor.	Total.	Male.	Female.
Both parents	14	12	2
Father	76	56	20
Mother	4	4	
Neither parent	186	166	20
Not stated	34	30	4
Totals	314	268	46

TABLE XXIII. Commitments to State Reform Schools during the Fiscal Years 1891-92 to 1909-10.

Counties.	1891-92	1892-93	1893-94	1894-95	1895-96	1896-97	1897-98	1898-99	1899-1900	1900-01	1901-02	1902-03	1903-04	1904-05	1905-06	1906-07	1907-08	1908-09	1909-10	Total.
Alameda	32	13	14	36	20	27	7	15	12	8	9	4	3	11	8	14	33	31	26	323
Alpine (no commitments).																				
Amador				3	2	1							1				2			9
Butte	4		2	3	3	1	1		1	1	4	6	3	3	3	6	12	4	10	67
Calaveras								1			1		2		1	1	2			8
Colusa			4	5	1		1	1	2				1	1	1		1	1		19
Contra Costa			1								1	1	1	4	1	2	7	3	4	25
Del Norte													2				4	2	1	9
El Dorado			1	1	1			1											1	5
Fresno	6	7	12	4	10	2			1	5	10	5	7	6	6	5	4	22	8	120
Glenn					1							1	1							3
Humboldt	1	1		2				4	1		2		4	1	2	1	1	1	5	26
Imperial																	1	2	2	5
Inyo																		1		1
Kern			1	6		3				3			2	4	2	1	1	1	8	32
Kings			2	2		1	3		2	2	1		1		1	1	1	1		18
Lake			1		1	1			1							1		1		6
Lassen													1					1		2
Los Angeles	69	58	51	75	50	47	20	47	35	30	39	61	68	42	59	62	51	70	73	1007
Madera			2	1					1	1	1		4		1	1	5	4		21
Marin				1							1		3	3	2	5	4	1	2	22
Mariposa	1																1		1	3
Mendocino		4	4	1		1		2					2							14
Merced	1		2		4	1	4	2				3	2	2	2	6	1	1	7	38
Modoc												1							2	3
Mono				1																1
Monterey	3	2	2	1	2	2	2			1	2			6	5	5	10	9	10	62
Napa	2	3		2			1		2				4	1	2			2	1	20
Nevada		3	3	2	3	2			2	3	1			1		1	2	1	11	35
Orange	3	1	6	4	7	1	3		3		4	3	3	3	2	5	3	3	1	55
Placer	3	2		3	1			1				1					1	2	3	17
Plumas															1					1
Riverside			8	1	2	2	1	4	3	4	4	2	8	3	6	6	5	8	6	73
Sacramento	7	10	4	6	4	6	1	4	5	1	2	4	2	3	6	6	8	8	18	105
San Benito			1								1							1		3
San Bernardino	16	13	13	12	8	6	3		2	2	1	2	8	9	6	3	8	8	7	127
San Diego	4	7	6	12	11	10	5	4	4		1	6	2	8	4	8	8	2	8	110

San Francisco	125	82	38	101	38	24	24	46	16	9	25	10	32	41	31	29	43	36	21	771
San Joaquin	6	2	2	4			1	5			3		1	1	5		3	5	4	42
San Luis Obispo	3	2	5		2	1		2				1	5	1	4	2	3	8	5	44
San Mateo			1													1	1	1	3	7
Santa Barbara	6	6	8	5	2	3	6	3	7	2	8	3	1	1	4	3	6	11	5	90
Santa Clara	2	6	6	7	11	9	9	9	7	10	11	14	12	12	7	6	8	21	23	190
Santa Cruz	1		4	4	2	3		5	4		1	3	3	4	4	2	6	5	5	56
Shasta	2			1			1		1			1	1		2	1				10
Sierra (no commitments).																				
Siskiyou				5			2				3	1	1	2		2	1	1	1	19
Solano	2	3		3	2	3		2	1	1		1	3	1	3		3		5	33
Sonoma	8	5	2	6	7	3	2	2	2	3	1	4	4	1	3		6	9	6	74
Stanislaus		1		1			1	1	1		1				1				8	15
Sutter								1		2				1	1					5
Tehama										1		1		2	2		2	1	3	12
Trinity (no commitments).																				
Tulare	1	3	3	3	6	6	5	1		4	2		4	4	6	4	2	4	4	62
Tuolumne				2						1			1	2			1		1	8
Ventura	2	4	3	2	10	1	4	2	3		2	2	4	4	6	4	7	5	2	67
Yolo		3	1			1			3	1			1			1		5		16
Yuba	1														1	2			1	5
Totals	311	241	213	328	211	168	107	165	122	95	142	140	209	188	201	197	268	*304	†314	‡3924

*One county not stated. †Two counties not stated. ‡Three counties not stated.

TABLE I. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1909. Showing Percentage to Number of Marriages, Plaintiffs, and Place of Marriage. (Tabulated by Counties.)

Counties.	Number of marriages.	Number of divorces.	Percentage of divorces to marriages.	Plaintiff.		Where married.			
				Husband.	Wife.	California.	United States excluding California.	Foreign.	Not stated.
Alameda	2453	328	13.4	85	243	228	80	16	4
Alpine (no divorces granted).									
Amador	53	9	17.0	2	7	8		1	
Butte	190	38	20.0	10	28	33	4	1	
Calaveras	37	8	21.6	3	5	7			1
Colusa	18	3	16.7		3	3			
Contra Costa	181	17	9.4	6	11	12	4		1
Del Norte	25	3	12.0		3	3			
El Dorado	49	11	22.4	3	8	10	1		
Fresno	681	98	14.4	21	77	58	32	8	
Glenn	30	3	10.0		3	3			
Humboldt	263	30	11.4	6	24	22	7	1	
Imperial	76	3	3.9	2	1		3		
Inyo	36	5	13.9	2	3	4	1		
Kern	220	29	13.2	13	16	18	10	1	
Kings	152	11	7.2	6	5	9	2		
Lake	39	6	15.4		6	5			1
Lassen	30	1	3.3		1	1			
Los Angeles	4667	686	14.7	200	486	355	285	23	23
Madera	72	6	8.3	2	4	6			
Marin	801	18	2.2	4	14	9	5		4
Mariposa	19	1	5.3		1	1			
Mendocino	153	32	20.9	13	19	23	6	2	1
Merced	89	11	12.4	3	8	8	3		
Modoc	44	2	4.6		2	2			
Mono	8	2	25.0		2	2			
Monterey	188	30	16.0	10	20	21	5	2	2
Napa	145	29	20.0	9	20	19	6	1	3
Nevada	128	15	11.7	4	11	9	5	1	
Orange	760	25	3.3	8	17	13	10	2	
Placer	81	22	27.2	8	14	18	4		
Plumas	11	3	27.3		3	3			
Riverside	313	51	16.3	9	42	34	16		1
Sacramento	824	148	18.0	37	111	116	21	2	9
San Benito	60	8	13.3	3	5	8			
San Bernardino	477	45	9.4	15	30	27	14	2	2
San Diego	631	74	11.7	22	52	42	31		1
San Francisco	4055	802	19.8	218	584	527	176	51	48
San Joaquin	532	61	11.5	15	46	49	12		
San Luis Obispo	223	18	8.1	6	12	14	3	1	
San Mateo	286	15	5.2	4	11	10	3	1	1
Santa Barbara	213	22	10.3	5	17	18	4		
Santa Clara	951	94	9.9	26	68	70	21	2	1
Santa Cruz	237	26	11.0	7	19	18	8		
Shasta	141	47	13.3	11	36	35	12		
Sierra	9	2	22.2	1	1	2			
Siskiyou	147	15	10.2	5	10	11	3		1
Solano	165	23	13.9	3	20	20	1	2	
Sonoma	382	47	12.3	9	38	39	6	2	
Stanislaus	151	17	11.3	1	16	13	3	1	
Sutter	28	7	25.0	2	5	6	1		
Tehama	95	19	20.0	4	15	15	4		
Trinity	7	2	28.6	2		2			
Tulare	257	23	8.9	13	10	18	5		
Tuolumne	56	5	8.9		5	3	2		
Ventura	137	13	9.5	2	11	12	1		
Yolo	105	7	6.7	3	4	6	1		
Yuba	63	11	17.5	3	8	8	2	1	
Totals	22244	3087	13.9	846	2241	2036	823	124	104

TABLE II. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1909. Showing Length of Time Married.
(Tabulated by Counties.)

Counties.	Number of divorces.	Length of time married.				
		Less than 5 years.	5 to 10 years.	11 to 20 years.	Over 20 years.	Not stated.
Alameda	328	65	136	85	42	
Alpine (no divorces granted).						
Amador	9	2	4	2	1	
Butte	38	7	15	8	8	
Calaveras	8	1	2	2	3	
Colusa	3	1	1		1	
Contra Costa	17	6	7	3	1	
Del Norte	3			3		
El Dorado	11	4	4	1	2	
Fresno	98	17	38	23	19	1
Glenn	3		2	1		
Humboldt	30	5	10	11	4	
Imperial	3		2		1	
Inyo	5	3	1	1		
Kern	29	7	8	12	2	
Kings	11	2	4	4	1	
Lake	6	3	2	1		
Lassen	1			1		
Los Angeles	686	107	296	188	85	10
Madera	6	1	2	2	1	
Marin	18	2	6	7	3	
Mariposa	1		1			
Mendocino	32	8	12	6	6	
Merced	11	3	5	2	1	
Modoc	2		2			
Mono	2		1	1		
Monterey	30	10	10	5	5	
Napa	29	4	11	7	7	
Nevada	15	2	6	7		
Orange	25	5	10	5	5	
Placer	22	4	12	5	1	
Plumas	3		2	1		
Riverside	51	10	22	10	9	
Sacramento	148	29	73	31	15	
San Benito	8		1	4	2	1
San Bernardino	45	7	15	18	5	
San Diego	74	13	26	20	15	
San Francisco	802	142	337	230	86	7
San Joaquin	61	10	28	13	9	1
San Luis Obispo	18	5	6	6	1	
San Mateo	15	3	7	4	1	
Santa Barbara	22	8	8	4	2	
Santa Clara	94	18	18	36	20	2
Santa Cruz	26	3	9	9	5	
Shasta	47	10	17	12	8	
Sierra	2		1	1		
Siskiyou	15	2	7	4	2	
Solano	23	4	7	8	4	
Sonoma	47	11	14	13	9	
Stanislaus	17	7	4	4	2	
Sutter	7	2	2	2	1	
Tehama	19	3	7	3	6	
Trinity	2		2			
Tulare	23	8	12		3	
Tuolumne	5		2	2	1	
Ventura	13	1	6	4	2	
Yolo	7	1	3		3	
Yuba	11	4	3	3	1	
Totals	3087	570	1249	835	411	22

TABLE III. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1909. Showing Cause for Divorce.
(Tabulated by Counties.)

Counties.	Number of divorces.	Cause of divorce.					
		Adultery.	Extreme cruelty.	Willful desertion.	Neglect and failure to provide.	Intemperance.	Conviction of a felony.
Alameda	328	16	121	135	37	17	2
Alpine (no divorces granted).							
Amador	9	------	5	1	2	1	------
Butte	38	2	5	19	8	3	1
Calaveras	8	1	4	2	------	1	------
Colusa	3	------	------	2	1	------	------
Contra Costa	17	------	5	8	4	------	------
Del Norte	3	------	2	1	------	------	------
El Dorado	11	2	4	3	------	2	------
Fresno	98	------	31	46	18	3	------
Glenn	3	1	1	------	1	------	------
Humboldt	30	------	6	17	5	1	1
Imperial	3	------	------	2	1	------	------
Inyo	5	2	1	2	------	------	------
Kern	29	------	6	20	2	1	------
Kings	11	------	------	10	1	------	------
Lake	6	------	3	3	------	------	------
Lassen	1	------	------	1	------	------	------
Los Angeles	686	59	161	361	69	26	10
Madera	6	2	1	3	------	------	------
Marin	18	------	6	6	5	1	------
Mariposa	1	------	------	1	------	------	------
Mendocino	32	3	13	8	8	------	------
Merced	11	------	1	7	3	------	------
Modoc	2	------	1	1	------	------	------
Mono	2	------	------	1	1	------	------
Monterey	30	------	12	13	4	1	------
Napa	29	------	13	10	4	1	1
Nevada	15	3	2	5	4	1	------
Orange	25	2	13	9	1	------	------
Placer	22	2	6	11	2	1	------
Plumas	3	------	------	2	1	------	------
Riverside	51	3	21	19	7	1	------
Sacramento	148	8	44	61	31	4	------
San Benito	8	------	2	5	------	1	------
San Bernardino	45	10	7	24	3	1	------
San Diego	74	6	19	37	8	3	1
San Francisco	802	29	263	335	156	12	7
San Joaquin	61	3	13	23	22	------	------
San Luis Obispo	18	1	6	8	2	1	------
San Mateo	15	1	4	3	4	3	------
Santa Barbara	22	2	5	10	3	2	------
Santa Clara	94	14	22	41	12	3	2
Santa Cruz	26	2	11	9	4	------	------
Shasta	47	1	18	16	10	2	------
Sierra	2	------	1	------	1	------	------
Siskiyou	15	------	6	8	------	------	1
Solano	23	2	9	5	3	4	------
Sonoma	47	1	16	20	6	4	------
Stanislaus	17	------	5	4	7	------	1
Sutter	7	------	4	2	1	------	------
Tehama	19	2	6	6	5	------	------
Trinity	2	1	1	------	------	------	------
Tulare	23	1	5	16	1	------	------
Tuolumne	5	------	1	1	2	1	------
Ventura	13	------	3	4	4	2	------
Yolo	7	------	4	3	------	------	------
Yuba	11	------	------	8	3	------	------
Totals	3087	182	919	1378	477	104	27

TABLE IV. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1909. Showing Number and Ages of Minor Children Affected and Number of Families Without Children. (Tabulated by Counties.)

Counties.	Number of divorces.	Number of families having no children.	Number and ages of minor children affected.				
			Number of children affected.	Less than 5 years.	5 to 10 years.	Over 10 years.	Ages not given.
Alameda	328	187	223	51	80	56	36
Alpine (no divorces granted).							
Amador	9	4	10	3	5	2	
Butte	38	22	31	9	11	11	
Calaveras	8	3	14	3	7	4	
Colusa	3	2	1		1		
Contra Costa	17	10	12	3	6	3	
Del Norte	3		5	1	2	1	1
El Dorado	11	9	3				3
Fresno	98	56	76	23	17	28	8
Glenn	3		4	2	1	1	
Humboldt	30	15	17	1	5	11	
Imperial	3	1	5	1	1	2	1
Inyo	5	4	3	1	1	1	
Kern	29	20	16	1	12	3	
Kings	11	7	6	1	2	3	
Lake	6	4	5	1	3	1	
Lassen	1		3	1	2		
Los Angeles	686	439	404	102	159	129	14
Madera	6	5	2			2	
Marin	18	11	17	1	5	11	
Mariposa	1		3	3			
Mendocino	32	15	31	10	9	9	3
Merced	11	7	10	2	3	5	
Modoc	2		2	2			
Mono	2	1	3			3	
Monterey	30	17	20	4	3	8	5
Napa	29	11	32	5	6	14	7
Nevada	15	7	20	5	10	5	
Orange	25	12	32	7	11	12	2
Placer	22	11	16		3	1	12
Plumas	3		6	2	3	1	
Riverside	51	24	63	13	23	24	3
Sacramento	148	90	93	36	34	23	
San Benito	8	5	4		3	1	
San Bernardino	45	25	31	6	12	12	1
San Diego	74	54	41	5	15	18	3
San Francisco	802	506	474	95	179	158	42
San Joaquin	61	36	42	17	8	16	1
San Luis Obispo	18	8	20	6	5	9	
San Mateo	15	11	6	1	2	3	
Santa Barbara	22	14	15	5	3	7	
Santa Clara	94	56	72	15	19	33	5
Santa Cruz	26	17	22	3	9	10	
Shasta	47	28	35	3	16	12	4
Sierra	2		4	1	3		
Siskiyou	15	6	21	1	7	11	2
Solano	23	15	16	5	6	5	
Sonoma	47	26	40	10	14	14	2
Stanislaus	17	8	19	2	8	6	3
Sutter	7	3	8	2	3	3	
Tehama	19	11	15	5	4	6	
Trinity	2	1	1		1		
Tulare	23	14	19	9	7	3	
Tuolumne	5	3	4		1	3	
Ventura	13	6	14	2	11	1	
Yolo	7	4	7	3		4	
Yuba	11	6	10	3	5	2	
Totals	3087	1857	2128	493	766	711	158

TABLE V. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1910. Showing Percentage to Number of Marriages, Plaintiffs, and Place of Marriage. (Tabulated by Counties.)

Counties.	Number of marriages.	Number of divorces.	Percentage of divorces to marriages.	Plaintiff.		Where married.			
				Husband.	Wife.	California.	United States excluding California.	Foreign.	Not stated.
Alameda	2496	417	16.7	108	309	278	89	19	31
Alpine	1								
Amador	53	9	17.0	4	5	5	2	2	
Butte	193	29	15.0	6	23	25	4		
Calaveras	23	6	26.1	1	5	6			
Colusa	36	6	16.7	1	5	5	1		
Contra Costa	158	23	14.6	5	18	18	3	2	
Del Norte	26	6	23.1	1	5	4	2		
El Dorado	36	5	13.9	1	4	4	1		
Fresno	697	91	13.1	20	71	62	23	4	2
Glenn	34	4	11.8	1	3	4			
Humboldt	294	27	9.2	4	23	20	6	1	
Imperial	73	15	20.5	6	9	5	8		2
Inyo	32	4	12.5	1	3	1	3		
Kern	313	40	12.8	12	28	23	16		1
Kings	213	13	6.1	5	8	12		1	
Lake	31	2	6.5		2	2			
Lassen	29	3	10.3	1	2	2	1		
Los Angeles	5110	776	15.2	197	579	391	320	27	38
Madera	48	6	12.5	1	5	4		1	1
Marin	871	25	2.9	5	20	17	3	2	3
Mariposa	6	2	33.3	1	1	2			
Mendocino	139	38	27.3	15	23	35	2		1
Merced	90	13	14.4	5	8	8	3	1	1
Modoc	38	8	21.1	2	6	6			2
Mono	5								
Monterey	159	33	20.8	8	25	26	3	2	2
Napa	164	18	11.0	4	14	14	2	1	1
Nevada	80	17	21.3	8	9	14	3		
Orange	878	27	3.1	11	16	16	10		1
Placer	92	6	6.5		6	4	2		
Plumas	25	5	20.0	3	2	2	2	1	
Riverside	319	29	9.1	11	18	17	11	1	
Sacramento	921	104	11.3	23	81	80	21	1	2
San Benito	58	6	10.3	4	2	3	3		
San Bernardino	522	50	9.6	22	28	29	20		1
San Diego	670	84	12.5	23	61	46	35	2	1
San Francisco	4327	874	20.2	267	607	578	191	63	42
San Joaquin	542	64	11.8	13	51	47	12	1	4
San Luis Obispo	215	17	7.9	6	11	13		3	1
San Mateo	342	26	7.6	5	21	18	4	3	1
Santa Barbara	224	26	11.6	6	20	17	6	2	1
Santa Clara	1003	116	11.6	25	91	79	24	4	9
Santa Cruz	263	37	14.1	8	29	29	5	1	2
Shasta	164	23	14.0	6	17	17	6		
Sierra	14	1	7.1		1	1			
Siskiyou	161	24	14.9	5	19	17	6		1
Solano	150	22	14.7	7	15	15	4	3	
Sonoma	373	55	14.7	18	37	45	8	2	
Stanislaus	120	16	13.3	5	11	12	3	1	
Sutter	30	3	10.0	1	2	3			
Tehama	103	9	8.7	2	7	8	1		
Trinity	9	2	22.2	1	1	2			
Tulare	273	29	10.6	6	23	19	10		
Tuolumne	60	7	11.6	2	5	7			
Ventura	150	14	9.3	2	12	12	1	1	
Yolo	95	12	12.6	1	11	10	1		1
Yuba	94	10	10.6		10	9			1
Totals	23645	3334	14.1	906	2428	2148	881	152	153

TABLE VI. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1910. Showing Length of Time Married.
(Tabulated by Counties.)

Counties.	Number of divorces.	Length of time married.				
		Less than 5 years.	5 to 10 years.	11 to 20 years.	Over 20 years.	Not stated.
Alameda	417	81	157	117	58	4
Alpine (no divorces granted).						
Amador	9	------	4	3	2	------
Butte	29	8	10	9	2	------
Calaveras	6	------	4	1	1	------
Colusa	6	------	2	2	2	------
Contra Costa	23	6	10	4	3	------
Del Norte	6	------	3	2	1	------
El Dorado	5	1	1	------	2	1
Fresno	91	20	35	23	11	2
Glenn	4	------	1	1	2	------
Humboldt	27	2	8	9	8	------
Imperial	15	5	3	4	3	------
Inyo	4	------	3	------	1	------
Kern	40	13	13	12	2	------
Kings	13	------	4	8	1	------
Lake	2	------	2	------	------	------
Lassen	3	------	2	------	1	------
Los Angeles	776	140	323	195	111	7
Madera	6	2	2	------	2	------
Marin	25	2	10	7	5	1
Mariposa	2	------	1	1	------	------
Mendocino	38	9	13	12	4	------
Merced	13	2	2	7	2	------
Modoc	8	1	2	2	2	1
Mono (no divorces granted).						
Monterey	33	6	15	7	5	------
Napa	18	5	4	3	6	------
Nevada	17	5	6	5	1	------
Orange	27	6	11	7	3	------
Placer	6	------	------	5	1	------
Plumas	5	------	3	1	1	------
Riverside	29	2	11	12	4	------
Sacramento	104	21	44	30	8	1
San Benito	6	2	2	1	1	------
San Bernardino	50	6	24	15	5	------
San Diego	84	17	26	20	20	1
San Francisco	874	212	350	226	74	12
San Joaquin	64	20	24	14	6	------
San Luis Obispo	17	------	5	9	3	------
San Mateo	26	4	12	5	5	------
Santa Barbara	26	5	7	9	5	------
Santa Clara	116	23	45	32	13	3
Santa Cruz	37	8	15	10	4	------
Shasta	23	7	10	5	1	------
Sierra	1	------	1	------	------	------
Siskiyou	24	10	7	2	5	------
Solano	22	3	11	8	------	------
Sonoma	55	8	15	21	11	------
Stanislaus	16	5	4	3	4	------
Sutter	3	2	1	------	------	------
Tehama	9	1	4	2	2	------
Trinity	2	------	2	------	------	------
Tulare	29	5	11	9	4	------
Tuolumne	7	1	4	1	1	------
Ventura	14	4	6	2	2	------
Yolo	12	2	7	2	1	------
Yuba	10	1	4	1	3	1
Totals	3334	683	1306	886	425	34

TABLE VII. Final Decrees of Divorce Granted in State of California for the Fiscal Year ending June 30, 1910. Showing Cause for Divorce. (Tabulated by Counties.)

Counties.	Number of divorces	Cause of divorce.					
		Adultery	Extreme cruelty	Willful desertion	Neglect and failure to provide	Intemperance	Conviction of a felony
Alameda	417	18	144	187	43	20	5
Alpine (no divorces granted).							
Amador	9		2	7			
Butte	29	1	9	13	6		
Calaveras	6		2	2	1		1
Colusa	6		2	3	1		
Contra Costa	23	1	6	9	5	2	
Del Norte	6		5			1	
El Dorado	5		3	1	1		
Fresno	91	6	34	34	11	5	1
Glenn	4		1	2	1		
Humboldt	27		4	18	4	1	
Imperial	15	1	2	9	3		
Inyo	4		1	1	1	1	
Kern	40	2	13	22	3		
Kings	13		3	8	1	1	
Lake	2			1	1		
Lassen	3			3			
Los Angeles	776	50	168	433	86	28	11
Madera	6		2	1	1	2	
Marin	25		8	10	5	2	
Mariposa	2			2			
Mendocino	38	5	12	14	5	2	
Merced	13	1	5	3	4		
Modoc	8		1	7			
Mono (no divorces granted).							
Monterey	33	1	11	17	2	1	1
Napa	18	1	2	11	4		
Nevada	17		7	8		2	
Orange	27	2	7	13	4	1	
Placer	6		2	3			1
Plumas	5		2	3			
Riverside	29	7	10	8	4		
Sacramento	104	3	34	36	23	8	
San Benito	6	1	4			1	
San Bernardino	50	2	7	30	5	5	1
San Diego	84	5	23	39	13	4	
San Francisco	874	14	289	387	146	33	5
San Joaquin	64	1	24	24	15		
San Luis Obispo	17	2	6	7	2		
San Mateo	26		7	14	4	1	
Santa Barbara	26	1	5	12	7	1	
Santa Clara	116	4	39	48	21	3	1
Santa Cruz	37		18	13	4		2
Shasta	23	1	7	8	4	2	1
Sierra	1		1				
Siskiyou	24	1	3	20			
Solano	22		15	5	1	1	
Sonoma	55	3	20	25	5	2	
Stanislaus	16	1	1	7	6	1	
Sutter	3		1	1	1		
Tehama	9	1	4	3	1		
Trinity	2		1	1			
Tulare	29	1	7	18	1	2	
Tuolumne	7	1	1	4	1		
Ventura	14		5	5	3	1	
Yolo	12		7	4		1	
Yuba	10	1	2	2	5		
Totals	3334	139	999	1566	465	135	30

CHART VIII.

Divorces: Showing Length of Time Married, Fiscal Years 1905-06 to 1909-10.

In this chart there is presented a record for the five fiscal years ending June 30, 1910, showing the length of time that couples had been married at the time a final decree of divorce was granted them. The largest group in each year were those married from five to ten years. This group has been gradually increasing, while the percentage of those married less than five years shows a slight decrease.

CHART VIII.

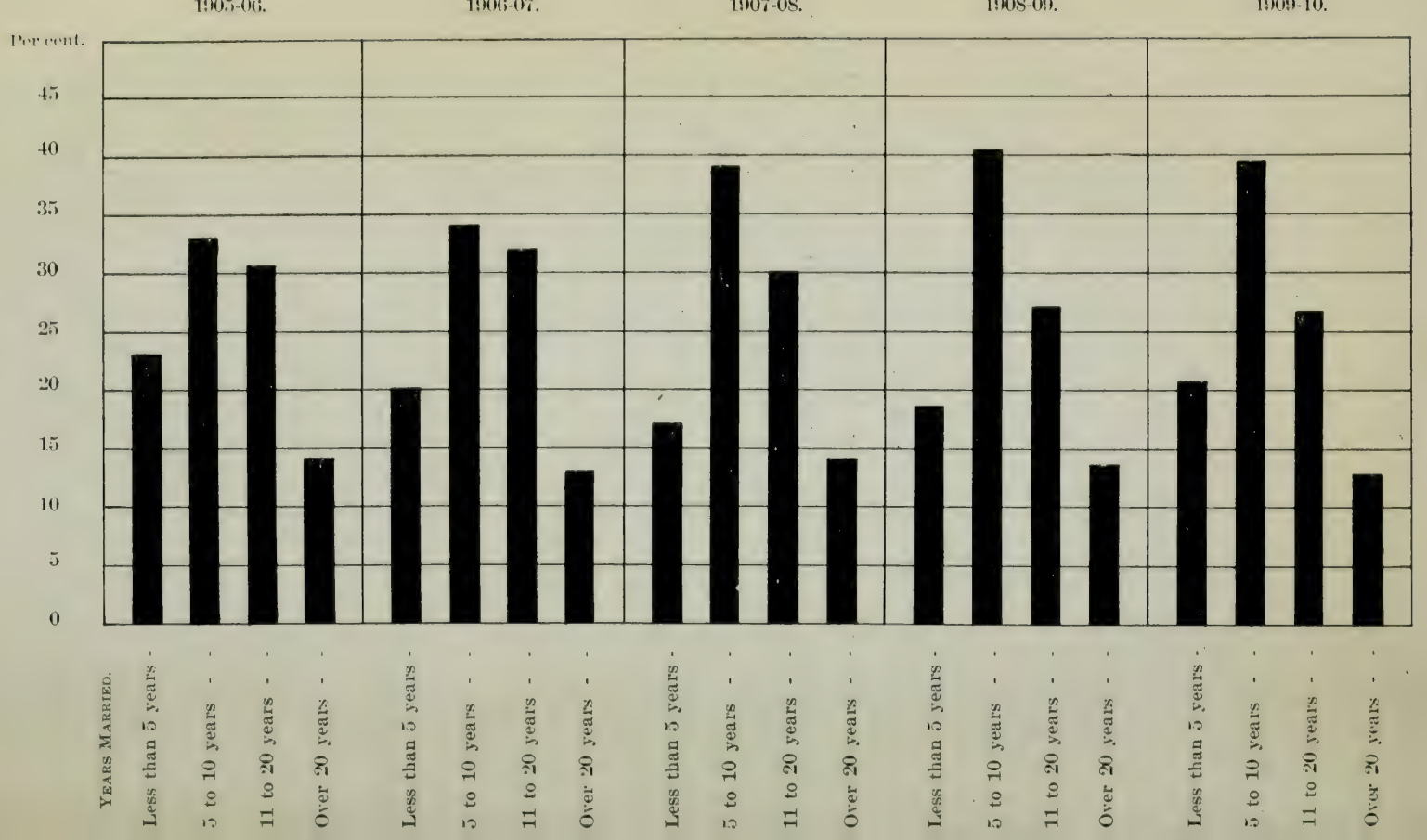

1905-06.
1906-07.
1907-08.
1908-09.
1909-10.
Per cent.
45
40
35
30
25
20
15
10
5
0
Years Married.
Less than 5 years
5 to 10 years
11 to 20 years
Over 20 years

TABLE VIII. Final Decrees of Divorce Granted in the State of California for the Fiscal Year ending June 30, 1910. Showing Number and Age of Minor Children Affected and Number of Families Without Children. (Tabulated by Counties.)

Counties.	Number of divorces.	Number of families having no children.	Number and ages of minor children affected.				
			Number of children affected.	Less than 5 years.	5 to 10 years.	Over 10 years.	Ages not given.
Alameda	417	228	303	87	107	93	16
Alpine (no divorces granted).							
Amador	9	5	6	1	2	3	------
Butte	29	17	24	5	10	9	------
Calaveras	6	2	10	3	1	1	5
Colusa	6	2	8	------	5	3	------
Contra Costa	23	10	25	5	10	7	3
Del Norte	6	1	12	6	3	3	------
El Dorado	5	2	4	1	2	1	------
Fresno	91	53	62	21	20	17	4
Glenn	4	------	10	1	2	4	3
Humboldt	27	16	20	4	6	9	1
Imperial	15	10	9	------	2	7	------
Inyo	4	3	7	------	3	4	------
Kern	40	31	14	7	3	4	------
Kings	13	3	26	3	11	12	------
Lake	2	------	3	2	1	------	------
Lassen	3	1	3	------	1	------	2
Los Angeles	776	522	426	113	161	135	17
Madera	6	1	10	4	5	1	------
Marin	25	12	24	7	6	9	2
Mariposa	2	1	3	------	2	1	------
Mendocino	38	20	38	15	16	7	------
Merced	13	5	16	3	6	7	------
Modoc	8	3	11	2	4	4	1
Mono (no divorces granted).							
Monterey	33	20	29	10	7	12	------
Napa	18	12	12	3	4	5	------
Nevada	17	12	7	3	3	1	------
Orange	27	15	22	7	11	1	3
Placer	6	2	8	4	2	2	------
Plumas	5	5	------	------	------	------	------
Riverside	29	9	44	10	15	19	------
Sacramento	104	64	67	16	27	20	4
San Benito	6	4	2	------	------	------	2
San Bernardino	50	30	33	5	14	10	4
San Diego	84	52	54	11	20	23	------
San Francisco	874	597	423	112	167	123	21
San Joaquin	64	42	34	9	12	12	1
San Luis Obispo	17	7	22	6	14	2	------
San Mateo	26	16	20	1	6	12	1
Santa Barbara	26	12	20	4	9	5	2
Santa Clara	116	62	109	32	43	33	1
Santa Cruz	37	21	33	4	18	11	------
Shasta	23	10	25	8	8	1	8
Sierra	1	------	2	------	2	------	------
Siskiyou	24	16	13	3	1	2	7
Solano	22	12	23	5	13	5	------
Sonoma	55	26	67	9	24	34	------
Stanislaus	16	10	11	4	2	1	4
Sutter	3	2	1	------	1	------	------
Tehama	9	3	8	2	4	2	------
Trinity	2	1	2	1	1	------	------
Tulare	29	12	31	8	6	13	4
Tuolumne	7	6	2	2	------	------	------
Ventura	14	5	17	7	5	5	------
Yolo	12	4	18	7	6	5	------
Yuba	10	4	9	2	4	3	------
Totals	3334	2041	2242	585	838	703	116

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